Jumpoff Joe Watershed Analysis

(REO Watershed 1710031002)

U.S. Department of the Interior
Bureau of Land Management
Medford District Office
Grants Pass Resource Area

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Dear Reader:

The purpose of this watershed analysis is to identify the various ecosystem components in the Jumpoff Joe fifth field watershed and their interactions at a landscape scale. It looks at historical ecological components, current ecological components and trends. It makes recommendations for future management actions that are needed to reach recommended ecological conditions.

As you read this document, it is important to keep in mind that the watershed analysis process is an iterative and ongoing process. As new information becomes available it will be included and updating will occur. It is also important to keep in mind that this analysis document is not a decision document. The recommendations that are included are a point of departure for project-specific planning and evaluation work. Project planning then includes the preparation of environmental assessments and formal decision records as required by the National Environmental Policy Act (NEPA). Project planning and land management actions would also be designed to meet the objectives and directives of our Medford District Resource Management Plan (RMP).

This watershed analysis will thus be used as a tool in land management planning and project implementation within the Jumpoff Joe watershed on Bureau of Land Management (BLM) administered lands. Although ecological information, discussions and recommendations are presented at the landscape scale irrespective of administrative ownership, please understand that the BLM will only be implementing management actions on the lands it administers.

Preparation of the Jumpoff Joe Watershed Analysis was initiated in the winter of 1994-95. The present document primarily follows the format outlined in the draft federal watershed analysis guidelines in effect at that time: 1994-96 Watershed Analysis Guidelines (June 1994) and that of *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis (Version 2.1, March, 1995)*. The format and terminology are thus slightly different from those of the more recent guidelines in the document entitled *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis (Version 2.2, August, 1995)*. The basic principles and approach embodied in the 1994 and 1995 documents are essentially the same.

If you have additional resource or social information that would contribute to our better understanding the ecological and social processes within the watershed, we would appreciate hearing about them.

Robert C. Korfhage
Field Manager
Grants Pass Resource Area

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Introduction

Watershed analysis is a key part of the implementation of the 1994 Northwest Forest Plan (NFP). It is conducted at a fifth field watershed scale and is a procedure with the purpose of developing and documenting a scientifically-based understanding of the ecological structure, functions, processes and interactions occurring within a watershed. It is one of the principal analysis used to meet the ecosystem management objectives of the NFP's Standards and Guidelines. It is an analytical process, not a decision-making process. A watershed analysis serves as a basis of developing project-specific proposals, and monitoring and restoration needs of a watershed. Watershed analysis is designed to be a systematic procedure for characterizing watershed and ecological process to meet specific management and social objectives.

This watershed analysis will thus document the past and current conditions of the Jumpoff Joe watershed, both physically and biologically. It will interpret the data, establish trends, and make recommendations on managing this watershed toward the desired future condition.

The first part of this analysis will address the core physical, biological and human features that characterize the watershed and their important ecological functions. Regulatory constraints that influence resource management in the watershed will also be identified. From this, key issues will be identified that will focus the analysis on the important functions of the ecosystem that are most relevant to the management questions, human values, or resource condition within the watershed.

Next, current and reference conditions of these important ecosystem functions will be described. An attempt to explain how and why ecological conditions and processes have changed over time will be made during the synthesis portion of the analysis.

The final portion of the analysis identifies the recommendations for the Jumpoff Joe watershed taking into account land management constraints and the demand for the watershed's resources. These recommendations will guide the management of the watershed's resources toward the desired future condition.

Two key management documents are frequently referred to throughout this analysis:

1. The Record of Decision for Amendments to the U.S. Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and its Attachment A, entitled the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest-Related Species within the Range of the Northern Spotted Owl (April 13, 1994), (**NFP-ROD**);

2. The Final Environmental Impact Statement (FEIS) and Record of Decision dated June, 1995 for the

Medford District Resource Management Plan (October, 1994), (**RMP-ROD**).

Jumpoff Joe Watershed Analysis Team Members

The following resource professionals worked as members of the watershed team:

Frank Betlejewski	--	Vegetation
Matt Craddock	--	Cultural/Minerals
Dale Johnson	--	Aquatic Habitat
Jeanne Klein	--	Recreation, Team Lead
Doug Lindsey	--	Roads
Marji Luther	--	Water
Dave Maurer	--	Soil/Water
Linda Mazzu	--	Special Plants
John McGlothlin	--	Geographic Information
Tom Murphy	--	Fire
Kip Wright	--	Wildlife

The team would like to thank Brendan White, U.S. Fish and Wildlife Service, for his participation in team meetings and supplying technical support. The team would also like to thank Barbara Kinney for the clerical support in pulling the document together.

I. Characterization

A. Purpose

The purpose of this, the Characterization section (Federal Guide for Watershed Analysis, Version 2.2, 1995), is to identify the dominant physical, biological and human processes and features of the watershed that affect ecosystem function or condition; to relate these features and processes with those occurring in the river basin or province; to provide the watershed context for identifying elements that need to be addressed in the analysis; and to identify, map and describe the land allocations, the forest plan objectives and the regulatory constraints that influence resource management in the watershed.

B. Introduction

The Jumpoff Joe watershed is located within the Klamath Mountain Geomorphic Province of southwestern Oregon in Josephine County approximately two miles north of the City of Grants Pass (see Maps 1a and 1b - All maps are located in Appendix A.). Approximately 14 million years ago this area began uplifting and has been shaped, primarily by water, into a mountainous bowl with a large valley floor. This bowl ranges in elevation from 800 feet to near 4,200 feet. It has nearly 600 miles of waterways that drain into the Rogue River. Approximately 25% of these waterways provide habitat for salmonids. The watershed's soils formed from exposed meta-volcanic and meta-sedimentary rocks and supports diverse forest vegetation types. The forests supply wood, recreation, and other special products for human purposes while providing habitats for many species of terrestrial and aquatic wildlife and plants. Many people have settled and developed the toeslopes of the mountains and along the valley floor.

C. Climate

The Jumpoff Joe watershed has a Mediterranean climate with cool, wet winters and warm dry summers. Average annual precipitation in the Jumpoff Joe watershed ranges from approximately 30 inches in the southwest portion of the watershed to 54 inches in the northeast. The Sexton Summit Weather Station is located within the Jumpoff Joe watershed at an elevation of 3,836 feet. Temperatures recorded at Sexton Summit show the lowest average monthly minimum temperature occurs in January at 30.5º F. The highest average monthly maximum temperature occurs in July at 75.1º F. Temperatures recorded at the Grants Pass Weather Station (located three miles outside the Jumpoff Joe watershed) show the lowest monthly minimum average occurs in January with a temperature of 32.3º F. The highest average monthly maximum in Grants Pass occurs in July at 89.8º F.

D. Ownership - Land Status (Land Use Allocations)

The Jumpoff Joe Watershed Analysis addresses all lands within the 69,702 acre Jumpoff Joe fifth field watershed.

For the purposes of the present analysis, the watershed is subdivided into two landscape

analysis units (LAU): Quartz Joe and Joe Louse. Quartz Joe LAU comprises 36,023 acres, and the Joe Louse LAU 33,679 acres. (see Map 2) . Table I-1 notes the land ownership pattern acreage.

Table I-1: Land Ownership in the Jumpoff Joe

	Acres	Percent of Total
Federal Land (BLM Administered)	21,456	31%
State, County, Private Land	47,926	69%
Watershed Total	**69,382**	

Maps 3a and 3b show the location of BLM-administered land in the watershed. Table I-2 summarizes the BLM acreage in different land status within the watershed.

Table I-2: BLM Ownership by Land Status

LAU	Oregon and California Lands (O&C) (Acres)	Public Domain Lands (PD) (Acres)	Rogue Wild & Scenic River (Acres)	Total
Joe Louse	11,124	2,530	--	13,654
Quartz Joe	6,469	1,289	44	7,802
Total	**17,593**	**3,819**	**44**	**21,456**

The Jumpoff Joe watershed is a non-key watershed with most of the federal lands being designated as "Matrix" under the NFP-ROD. Matrix consists of those federal lands outside the six categories of designated areas: Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Managed Late-Successional Reserves, Administratively Withdrawn Areas, and Riparian Reserves. The matrix allocation is where most timber harvest and other silvicultural activities are conducted. It is where the scheduled timber harvest activities will be located. In addition to managed forests, the matrix includes both non-forested areas and forested areas that are technically unsuitable for timber production. These unsuitable areas do not contribute to the timber land base upon which the Probable sale quantity (PSQ) is determined. Probable sale quantity estimates the sustainable harvest level given the management decisions of the RMP-ROD.

Riparian Reserves, which protect aquatic and late-successional forest habitats, border all the streams throughout the matrix. These areas are a critical part of the NFP's Aquatic Conservation Strategy (ACS) to restore and maintain the ecological health of watersheds and aquatic ecosystems. The main purposes of the reserves are to

protect the health of the aquatic system and its dependent species and to provide benefits to upland species. These reserves help maintain and restore riparian structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitats for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial and aquatic animals and plants, and provide for greater connectivity of late-successional forest habitats (NFP-ROD, pp. 7).

The RMP-ROD deferred approximately 7,400 acres of federal land in the upper portion of this watershed from timber harvest activities and other surface disturbing activities for 10 years starting in January 1993, due to cumulative impacts of past activities. Management activities of a limited nature (*e.g.*, riparian, fish or wildlife enhancement, salvage, etc.) could be permitted in these areas if the effects will not increase the cumulative effects to water quality (RMP-ROD, pg. 42).

Maps 4a and 4b show the location of the matrix land allocation and the deferred watershed. Table I-3 summarizes the acreage in each.

Table I-3: BLM Acres by Land Use Allocations

Matrix (Without Deferred Watersheds)	Deferred Watersheds in Matrix	Congressionally Withdrawn Areas	Total BLM Acres in a Watershed
14,010	7,402	44	21,456

E. Regulatory Considerations

Important federal laws pertinent to management of the federal lands in the watershed include: The Clean Water Act, National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), the National Historic Preservation Act (NHPA), Endangered Species Act (ESA), Clean Water Act (CWA), National Wild and Scenic Rivers Act, and the Oregon and California Lands Act (O&C Act).

F. Erosion Processes

1. Processes

The dominant erosion processes occurring in this watershed are concentrated flow erosion (sheet/rill erosion and gully erosion), stream channel erosion, and mass wasting. Areas that may be susceptible to these kinds of erosion when not protected are shown on Map 7 (Soil Conservation Service 1979). Erosional processes within the landscape are driven by gravity and the influence of water (precipitation and runoff) on soil shear strength. Other factors that have influenced the erosion process on the landscape are climate, vegetation and fire. Water erosion

is important as it not only detaches soil particles (and sometimes earthen material), but also transports the material downhill.

Concentrated flow erosion is a concern on hill slopes that have had most of the vegetation removed and where roads have concentrated runoff in unconsolidated ditches and diverted it to where surface protection is inadequate. Soil erosion occurs when soil particles are detached by raindrop splash or the overland flow of water and moved to another location on the landscape. Eroded soil particles can move from less than an inch to many miles depending on the topography and vegetative condition of the land. This erosion is of concern because it can reduce the amount of soil on a landscape, thus decreasing the productivity of the land and increasing sediments in local waterways.

Gull erosion occurs in this watershed predominantly on granitic soils where disturbance has occurred. Granitic soils are highly erosive. A small rill can be changed into a two-foot gully in one heavy rainfall event. Gullies can be a major source of sediment in local streams.

Channel erosion occurs as large volumes of water and debris rush through the waterways dislodging soil particles from the streambanks and transporting them downstream. This type of erosion is important as it can widen a stream channel which may cause the stream to spread and become shallower. Also, the detached soil sediments may deposit in fish spawning gravel or rearing pools reducing habitat effectiveness. High road densities may activate this type of erosion because of increased peak flows that is caused (see Road Density section below). Deep, fine textured soils that occur at the base of upland areas on fans, footslopes, and terraces are most susceptible to channel erosion.

Mass movement processes in the Jumpoff Joe watershed occur in different forms. These forms are raveling on steep slopes, soil creep, earthflows, slumps and debris slides. These phenomenon occur on different portions of the landscape and under different conditions but most involve water saturated soil moving downhill. This type of erosion is important as many tons of soil may be lost on the hillside. The soil moving downhill eventually reaches a stream or waterway and can have detrimental affects. Soils that commonly occur in the watershed have steep slopes coupled with depth and fine texture. These soils are indicative of mass movement potential.

These erosional processes combined with the uplifting of the landscape that has been occurring for the last 14 million years are primarily responsible for the morphological characteristics of the watershed. As the landscape is uplifted, belts of varying rock types are exposed to weathering. The uplifting process occurred faster than the erosional process which has resulted in steeply incised stream canyon streams (draws) with high gradients in most of the watershed (Rosgen Aa+) and alluviated valley streams with low to moderate gradients and entrenched channels (Rosgen B and F). Riparian areas along these streams provide habitats for plants and animals associated with the aquatic resources. Many of the riparian areas of the streams in the watersheds have been disturbed as a result of past timber harvest, roads or fire.

2. Forest Soil Productivity

Certain types of forest soils in this watershed have low productivity or are particularly sensitive to ecological changes that could reduce productivity (see Map 8). These serpentine influenced soils and steep granitic soils are particularly affected by mineral chemistry and organic matter development.

Mineral chemistry is of particular concern for serpentine-influenced forest soils. Serpentine rock has a high proportion of magnesium. As serpentine weathers, the resulting soils are dominated by magnesium with far less calcium and other cation nutrients. Plants generally do best with far greater calcium than magnesium. Therefore, plant species and productivity on serpentine-influenced soils are limited.

Organic matter development is usually at a critical balance on steep granitic forest soils. The accumulation of surface duff/litter is usually minimal (less than one inch). The fine humus colloids in the upper mineral soil typically extend to only a four-inch depth. These two forms of organic matter help with water retention, provide nutrients, provide a binder to maintain soil structure, and help make nutrients available to plants. With loss of the duff/litter layer, the bare mineral soil is highly susceptible to concentrated flow erosion. With depletion of soil organic matter comes a reduction in productivity.

3. Road Density

Road density is the measurement of total road length for a given area, commonly miles of road per square mile. It is a concern because generally roads intercept surface water and shallow groundwater and route it to natural drainage ways. This concentrates and increases natural runoff and may cause erosion. It may bring sediment to the stream system. Peak stream flows may increase compared to stream flows in areas with few or no roads. Increase peak flows may increase stream bank erosion. Road densities in excess of four miles per square mile are considered a high level and will have detrimental cumulative effects on stream water quality and quantity.

A cumulative effects analysis based on six subwatersheds within the Jumpoff Joe watershed (see Table 4, Current Condition) showed high road densities in all six. These subwatersheds, representing about a third of the total area (mostly on the eastside), have road densities that are greater than five miles per square mile.

G. Hydrology

There are approximately 596 miles of streams in the Jumpoff Joe watershed. The headwaters of these streams are generally steep and fast flowing, 71% of which are intermittent.

The stream flow in the Jumpoff Joe watershed fluctuates with the seasonal variation in rainfall. Peak flow events occur during high-intensity storm events of long duration, usually in the winter and early spring. (USDI BLM

Cheney Slate Watershed Analysis 1996). The maximum recorded discharge for Jumpoff Joe Creek was 13,500 cubic feet per second (cfs) on January 15, 1974. The maximum recorded stream flow for Louse Creek (data are from monthly, not daily, readings) was 323 cfs on April 13, 1982.

One of the main hydrological characteristics of the Jumpoff Joe watershed is the minimum stream flow amount that occurs during the late summer and early fall. Most of the watershed is below 4,000 feet in elevation and snowpack contributes very little to the late spring and summer water flows. As a result, stream flow amounts are less than 5 cfs during the late summer and early fall. Certain reaches of Jumpoff Joe and Louse Creeks, the two major streams in the watershed, sometimes have no water flowing in the late summer and early fall, particularly during years of low rainfall.

H. Water Quality

Water quality varies greatly throughout the Jumpoff Joe watershed. Jumpoff Joe Creek and Louse Creek have been identified as water quality limited under various criteria and nonpoint water pollution has been identified as moderate to severe in these two streams. The types of water quality and pollution are detailed in Chapter III, Current Condition.

I. Stream Channel

The major streams in the Jumpoff Joe watershed can be classified into three stream types, based on the Rosgen system of stream classification: A, B and F. Type A are steep entrenched, cascading, step/pool streams with high energy transport associated with depositional soils and are very stable if bedrock or boulder-dominated. Type B are moderately entrenched, have a moderate gradient with a riffle-dominated channel and with infrequently spaced pools. They have a very stable plan and profile with stable banks. Type F are entrenched, meandering and have a riffle/pool channel on low gradients with high width/depth ratios.

J. Vegetation

The Jumpoff Joe watershed is dominated by mixed conifer and mixed conifer/hardwood forests. The watershed is characterized by high fire frequencies both historically and to a lesser extent in the present. Fire exclusion has resulted in significant increases in densities (more stems per acre), shifts in species composition (*e.g.*, increases in fire intolerant, shade tolerant species) and changes in stand structure. These transformations have made the forests more susceptible to large, high-severity fires and to epidemic attack by insects and disease.

An additional effect on the plant communities in the Jumpoff Joe watershed has been the result of more direct human influences. Mining, logging, agriculture, road building and residential development have reduced the amount of late-successional forest within the watershed while increasing the amount of early seral stages.

The Jumpoff Joe watershed contains at least six plant series: white oak, Ponderosa pine, Douglas-fir, Jeffrey pine, white fir, and western hemlock. (Plant communities (associations) with the same climax dominant(s) are referred to as plant series. The Jeffrey pine series, for example, consists of associations in which Jeffrey pine is the climax dominant (Atzet and Wheeler 1984).)

K. Human Uses

The land ownership pattern of the Jumpoff Joe watershed was molded in the late 1800's and early 1900's. The lands in the watershed in the mid 1800's were public lands owned by the United States and administered by the General Land Office. The first large scale transfer of public lands from federal ownership was to the State of Oregon following statehood in 1859.

In order to further develop the West, Congress passed several laws enabling settlers to develop and obtain ownership of the public lands. These included Donation Land Claim patents, entry under the Homestead Acts, military patents and mineral patents. In addition to these types of deeds, land was deeded to the Oregon and California Railroad (O&C), with some of those lands being sold to private individuals. In reviewing the master title plats for the Jumpoff Joe watershed, it is apparent that ownership of several of the low elevation lands were originally deeded from the United States to private individuals through the above Acts of Congress.

Current human use of the watershed includes timber production and harvesting, mining, ranching, and dispersed recreation. The population is increasing with many newcomers in the area. Recreational use of the area is dispersed and includes off-highway vehicle (OHV) use, hunting, mountain biking, and equestrian use. There are currently many nondesignated trails and footpaths in the area. A portion of the Quartz Creek off-highway vehicle area is located in the northwestern corner of the watershed.

The Merlin Landfill is located within the watershed. The landfill is located on lands formerly administered by the BLM and leased to the City of Grants Pass. The BLM lands were deeded to the city in 1997 through Public Law 105-39. Therefore, the BLM no longer has an interest in the lands.

L. Fire

1. Background

Fire regimes of the Pacific Northwest are a function of the vegetation growth environment (temperature and moisture patterns), ignition pattern (lightning, human,) and plant species characteristics (fuel accumulation, adaptations to fire). Effects of forest fires can be more precisely described by grouping effects by fire regimes. Agee (1981) describes three broad fire regime categories (these can and often do overlap considerably with one

another):

High-severity regimes: Fires are very infrequent (more than 100 years between fires); they are usually high-intensity, stand replacement fires.

Moderate-severity regime: Fires are infrequent (25-100 years); they are partial stand replacement fires, including significant areas of high and low severity.

Low-severity regime: Fires are frequent (1-25 years); they are low-intensity fires with few overstory effects.

Fire regimes are the manifestation of the biological, physical, climatic and anthropomorphic components of an ecosystem as reflected in the type, frequency and size of fires (Pyne 1982). This is a relationship that perpetuates itself in a circular and stable pattern. The biotic components are an expression of the fire regime, and in turn maintain the pattern and occurrence of fire. However, when any components of the ecosystem are modified, the fire regime is prone to change.

The persistence of certain species in southwestern Oregon through the millennia can be attributed to their adaptations to fire (Kauffman 1990). Adaptations for fire survival are adaptations to a particular ecosystem and its specific fire regime. If the regime is altered, the capacity for that species to survive in the environment may be greatly changed.

2. Fire Disturbance

The fire regime for the Jumpoff Joe watershed has historically been a low-severity one. Fires in a low- severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire then in its absence (Agee 1990). Frequent, low-severity fires keep sites open so that they are less likely to burn intensely even under severe fire weather.

With the advent of fire exclusion/suppression, the pattern of frequent low-intensity fire ended. Dead and down fuel and understory vegetation are no longer periodically removed. This creates a trend toward ever increasing amounts of available fuels present. The longer interval between fire occurrences creates higher intensity, stand replacement fires rather than the historical low-intensity stand maintenance fires.

It is important to recognize that each vegetation type is adapted to its particular fire regime and not to any fire regime (Agee 1981). The significance of this is that the historical vegetation types that existed prior to Euro-American settlement cannot be maintained in the present fire regime that has resulted from fire exclusion.

3. Fire Risk

Human actions greatly influence the pattern of fire occurrence and number of fires in the watershed. The watershed as a whole has a high level of risk of human caused ignition. Human uses which create ignition risk include residential, industrial (light manufacturing, timber harvest, mining/quarry operations), recreational, tourist and travel activities. Human use within the watershed is high. The human caused fire occurrence pattern for the watershed would generally be a fire starting on private lands at low elevations and burning onto BLM lands reaching the uppermost ridgetops.

Lightning occurrence in the watershed has been high. The watershed typically experiences at least one lightning storm event each summer. Multiple fire starts often result from these storms.

The potential for a large fire is high to extremely high for this watershed. This is due to the buildup of fuels, both live and dead, overstocking of conifers and hardwoods, and the presence of less fire resistant species which have invaded in the absence of frequent fire occurrence and past management practices that created but did not treat slash.

M. Species and Habitats

1. Special Status Plants

Only a small portion of the Jumpoff Joe watershed has been surveyed for special status plants. Completed surveys have centered around the Jumpin' Jack, Daisy Grave and Roadside Hazard tree projects. The northern portion of the watershed is the only area that has been surveyed. This area contains serpentine-influenced soils where native grass and shrubland exist.

The special status plant, *Camassia howellii,* can be found in the northern portion of watershed. The species was a Category 2 candidate (now called Species of Concern) under the Federal Endangered Species Act and is also a candidate species under the Oregon Endangered Species Act. Due to changes with protection categories under the Federal Endangered Species Act, the plant is now also considered as Bureau-sensitive by the BLM. Due to the number of locations found (24 populations), it can be postulated that the species is fairly abundant in the serpentine grass/shrublands in the watershed. Populations tend to be scattered in these grassy areas with individuals numbering between 100 and 200 per site.

Two populations of *Cypripedium fasciculatum* have been found in the watershed. This species is a survey and manage (S&M) (Category 1 and 2) species under the NFP. The small number of known populations is probably due to the lack of surveys in the watershed. Adjacent watersheds contain numerous populations. The species is found primarily in late-successional, mixed evergreen habitats with moist microsite conditions. This type of

habitat may also harbor *Cypripedium montanum* and *Allotropa virgata,* also S&M species.

2. Aquatic Species

Factors such as stream temperature, number and depths of pools, large woody material, stream meander, road/stream crossings and sedimentation are key to the survival of salmonids and can severely limit fish production. Rearing salmonids require a water temperature of 58EF for optimum survival condition. Stream temperature is dependent upon riparian area temperature and both are influenced by heat sinks such as nearby roads and open meadows. Most fluvial streams in the Rogue River basin are deficient in the numbers of pools. Pools provide depth for hiding cover and volume for rearing habitat. A goal for adequate pool to riffle ratio is 40:60 or 30:70 depending on the geomorpholgy of the watershed.

Cutthroat trout, steelhead, coho and chinook salmon are found in the Jumpoff Joe watershed. Each are a cold water species and require complex habitats, especially in the early life stages. Quantitative abundance estimates are absent. A qualitative analysis depicts a low abundance of cutthroat and coho and low to moderate abundance for steelhead and chinook based on professional observations. Cutthroat trout and coho salmon can be considered an indicator species for the health of an aquatic ecosystem. Cutthroat and steelhead typically have a wider range of distribution and are found higher in the tributaries than coho and chinook. Factors limiting salmonid production include: 1) The lack of water during the end of a water year, 2) high water temperatures, 3) erosion/sedimentation to streams, 4) lack of large woody material in the stream and riparian area, 5) lack of rearing and holding pools for juveniles and adults, respectively, 6) channelization of streams in the canyons and lowlands, and 7) blockages of migration corridors.

The American Fisheries Society, (Nehlsen *et al.* 1991) identified 314 stocks of anadromous fish at risk of extinction. Coho salmon are considered at a moderate risk for extinction. Coho are listed as a federally-threatened species in the Rogue River system. Steelhead are proposed as threatened or endangered in the Rogue River basin.

Table I-4 lists special status and federally-threatened aquatic species inhabiting the Jumpoff Joe watershed.

Table I-4: Special Status and Federally-Threatened Aquatic Species

Species	Status
Steelhead	National Marine Fisheries Service proposes threatened status for wild steelhead in southern Oregon and northern California (5/95).

Table I-4: Special Status and Federally-Threatened Aquatic Species

Species	Status
Coho Salmon	All coastal stocks south of Cape Blanco and north of Punta Gorda are threatened (Federal), (June 1997). American Fisheries Society "at risk" (Nehlsen et al, 1990) State of Oregon sensitive (ODFW 1992)
Pacific Lamprey	Federal Category 2 (USDI 1994)

3. Wildlife

The threatened northern spotted owl (*Strix occidentalis caurina*) is the only known listed animal in the Jumpoff Joe watershed. There is no U.S. Fish and Wild Service (USFWS) designated critical habitat in the watershed, but there are eight established 100-acre core areas in the watershed. These areas are Managed Late-Successional Reserves (NFP-ROD, RMP-ROD).

Key processes for wildlife include dispersal and migration of wildlife within and through the watershed. This process is highly dependent on quality, quantity and spatial distribution of appropriate habitat through time. Species habitat requirements vary greatly and a single dominate vegetative structure will not meet the needs of all species. Migration can occur at a localized level or at regional level. Species migrating through the watershed on a regional level include animals as diverse as insects, bats and birds. Localized migration allows for species to take advantage of foraging opportunities and cover during inclement `conditions. Localized dispersal of species is critical for insuring gene flow and repopulation of uncolonized habitat.

The high diversity of soil types and consequent vegetative communities and habitats in the Jumpoff Joe watershed provides for the potential of a host of sensitive animal species. There is potential habitat for 46 vertebrate special status species (15 mammals, 19 birds, and 12 reptiles and amphibians). In addition, nine more sensitive invertebrates species are known to occur in the vicinity (see Chapter III, Current Condition, for a complete list of sensitive species). Relatively few formal surveys for wildlife have been conducted in the watershed. Distribution, abundance and presence for the majority of the species is unknown. Other species of concern include cavity nesting species, band-tailed pigeons and neotropical migrant birds. Twenty-one special status species are associated with older forest, eight with riparian, and eight with special habitats such as caves, cliffs and talus. The remaining species are associated with habitats such as oak stands, meadows and pine savannahs (see Chapter V, Synthesis and Interpretation, for habitat trends). The NFP-ROD has identified additional "Survey and Manage" wildlife species that probably occur in the watershed: two amphibians and one mammal (see Chapter III, Current Condition).

II. Key Issues

The purpose of this section is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed (Federal Guide for Watershed Analysis, Version 2.2, 1995).

Key issues are identified in order to focus the analysis on the unique elements of the watershed. Key issues are addressed throughout the watershed analysis process within the context of the related core questions. (Federal Guide for Watershed Analysis, pg. 12-14). Key issues identified are summarized in Table II-1. A short narrative follows which discusses the relevance of each key issue in the watershed. Issues are not in any order of relative importance.

Table II-1: Key Issues

Key Issues	Related Core Topic
1. The watershed encompasses a large rural interface area. There is a lot of private property in the watershed. There is a consequent high risk of fire.	Fire, Human Uses
2. Fire - There is a high potential for large scale stand replacement fires.	Fire, Vegetation
3. The watershed includes a "deferred watershed;" deferred from timber harvesting due to the cumulative effects of past activities.	Hydrology
4. There are high road densities.	Human Uses, Hydrology, Erosion Processes, Species and Habitat
5. The Merlin Landfill is located within the watershed. Studies have confirmed the presence of low levels of volatile organic compounds in the groundwater around the landfill.	Human Uses, Hydrology
6. Old sawmill site - Leachates from sawdust piles; stream relocated from original location.	Water Quality, Species and Habitat
7. Serpentine meadows - Encroachment into the meadows by forest with a consequent decline of special status plants.	Species and Habitat, Fire
8. Road drainage culverts - Current culverts are undersized, deteriorating, and block fish passage.	Human Uses, Stream Channel, Species and Habitat
9. Quartz Creek OHV area affects recreation, fire and water quality.	Human Uses, Hydrology, Erosion Processes, Fire
10. Forest Soil Productivity - A portion of the watershed contains low productivity soils.	Erosion Processes, Hydrology, Vegetation
11. Occurrence of sensitive species.	Species and Habitat

A. Rural Interface Area *and*
B. Fuels and Fire

There is a high level of risk for a large scale, high-severity wildfire within the watershed. Mixed land ownership, rural interface area and proximity to population centers increase the complexities of fire protection, fuels management and hazard reduction programs.

Fire exclusion has created vegetation and fuel conditions with high potential for large, destructive and difficult to suppress wildfire occurrence. The watershed has a large amount of high values at risk of destruction and loss from wildfire. High-severity, stand replacement wildfire presents a threat to human life, property, and nearly all resource values within the watershed. Management activities can reduce the potential for stand replacement type fires through hazard reduction treatments. Public acceptance of hazard reduction management activities will be critical for the long-term health and stability of the forest ecosystem within the watershed.

C. Deferred Watersheds

The Jumpoff Joe watershed consists of numerous smaller subwatersheds or "drainage areas" (HUC 6 and 7's). The upper Jumpoff Joe and Louse Creek subwatersheds, located on the eastside of the Jumpoff Joe watershed, were designated as Deferred Watersheds in the 1995 RMP.

Further timber harvesting was deferred for 10 years due to the cumulative effects of past logging: soil compaction, high road densities and the consequent effects on the aquatic ecosystems. Soil compaction and high road densities generally cause increased runoff due to decreased soil infiltration rates. This creates increased sediment in streams and higher peak stream flows. With increased peak flows, channel banks may erode adding more sediment to streams.

D. High Road Densities

There are high road densities throughout much of the Jumpoff Joe watershed. This relates to soil erosion, water quality and quantity issues. Roads concentrate surface and shallow groundwater and routes it to natural drainageways. High road densities can also have numerous adverse impacts on fish and wildlife. Roads lead to increased vehicular/human disturbances, serve as access for poaching and fragment areas of habitat.

E. Merlin Landfill

The Merlin Landfill, an operating solid waste facility, is located on lands owned by the City of Grants Pass approximately two miles east of Merlin. The landfill was opened in 1967 on lands originally administered by the BLM. Title passed to the city from the BLM in the fall of 1997.

A site investigation conducted in 1988 confirmed the presence of low levels of volatile organic compounds in the groundwater on and off the site. Because the release occurred on federal land, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) required BLM to place the site on the federal facilities list. As such it must be cleaned up. The city has been aggressively working toward this goal since 1991 and has spent over $3,000,000 to meet current environmental standards.

As a result of the expense to be incurred by the city in the future, specifically the cleanup and closure of the landfill, the city has been looking at increasing the revenue at the site. In order to acquire these funds, the city has increased the fees at the landfill substantially. This has resulted in an increase of dumping on public lands within the commuting area of the landfill as some citizens seek to avoid using the landfill. Dumping on public lands has also resulted in potential health and safety hazards. Costs for the cleanup of these small dumps have also skyrocketed.

F. Old Sawmill Site

Approximately eight miles up Jumpoff Joe Creek, there is an old sawdust pile from a sawmill closed and abandoned several decades ago. Leachates from the sawdust include lignin, tannin, sugars, nitrogen and phosphorus. Entering the streams, it can decrease water quality for fish. The stream was also rerouted from the original channel when the sawmill was built and still runs in the rerouted channel.

G. Serpentine Soils/Meadows

Due to past fire suppression serpentine openings in the Jumpoff Joe watershed are being encroached upon by surrounding trees and shrubs and invaded by exotic annual grasses. These openings, which are dependent on periodic fire to maintain them, provide the main habitat for *Camassia howellii*, a Bureau- sensitive species. The Jumpoff Joe watershed harbors more populations of this species than any other watershed in the resource area. Surrounding trees and shrubs as well as exotic grasses appear to be filling in these openings, reducing potential habitat for this special status species.

H. Undersized Drainage Pipes on Roads

Culvert installations prior to 1992 were designed to accommodate a 25 to 50 year flood event or sized based on channel width and stream flow. Today's culvert design standards are that they accommodate a 100-year flood event. During road inventories existing culverts are evaluated for future replacement to meet a 100-year flood event.

I. Quartz Creek OHV Area

The Quartz Creek off-highway vehicle (OHV) area is a RMP designated site of 7,120 acres, the only OHV area

in the Grants Pass Resource Area. A majority of this area is in the Jumpoff Joe watershed. Due to topography use is largely limited to existing roads and trails. This use does, however, affect water quality, erosion processes and fire management. A fire prevention and protection plan will be developed within an anticipated recreation plan for this area.

J. Forest Soil Productivity

For the Jumpoff Joe watershed, two conditions of forest soil productivity are of note: 1) Low productivity influenced by serpentine minerals and, 2) sensitive productivity of steep granitic soils. Soil derived from serpentine materials are inherently low in productivity, generally due to a low calcium/magnesium ratio. The types of vegetation that can live on serpentine soils are also limited and there are a number of species endemic to the serpentine soil sites. Conifers that grow in serpentine influenced soils include: Jeffrey pine is best adapted, Incense-cedar and Ponderosa pine.

Steep granitic soils generally have moderate levels of forest productivity. The protective duff/litter layer of these soils is commonly less than one-inch thick. If the duff/litter layer is lost due to disturbance, the highly-erosive mineral soils may be stripped of mineral top soil leaving decomposed granite with very little natural fertility.

Five point inventory (Continuous Forest Inventory/CFI) plot data taken only on "timber base" lands indicates that most of the lands in the Jumpoff Joe watershed are on the low end of the timber production spectrum. Site quality is ranked from site class 1 to 5. Site class 1 land is the most productive and site 5 land is the least. Seventy-five percent of the plots fell on site class 5 ground (15 plots), 20% were on site 4 lands (4 plots), 5% fell on site 3 ground (1 plot).

Fifteen of the CFI plots were in the Joe Louse subwatershed and 5 were in the Quartz Joe subwatershed which indicates that more lands suitable for timber production occur within the Joe Louse subwatershed.

K. Sensitive Species

The Jumpoff Joe watershed supports a number of sensitive plants and animals. The primary factor affecting these species is habitat quality and quantity. The Endangered Species Act (ESA) and the Northwest Forest Plan outline the federal responsibilities regarding the management of sensitive species.

III. Current Condition

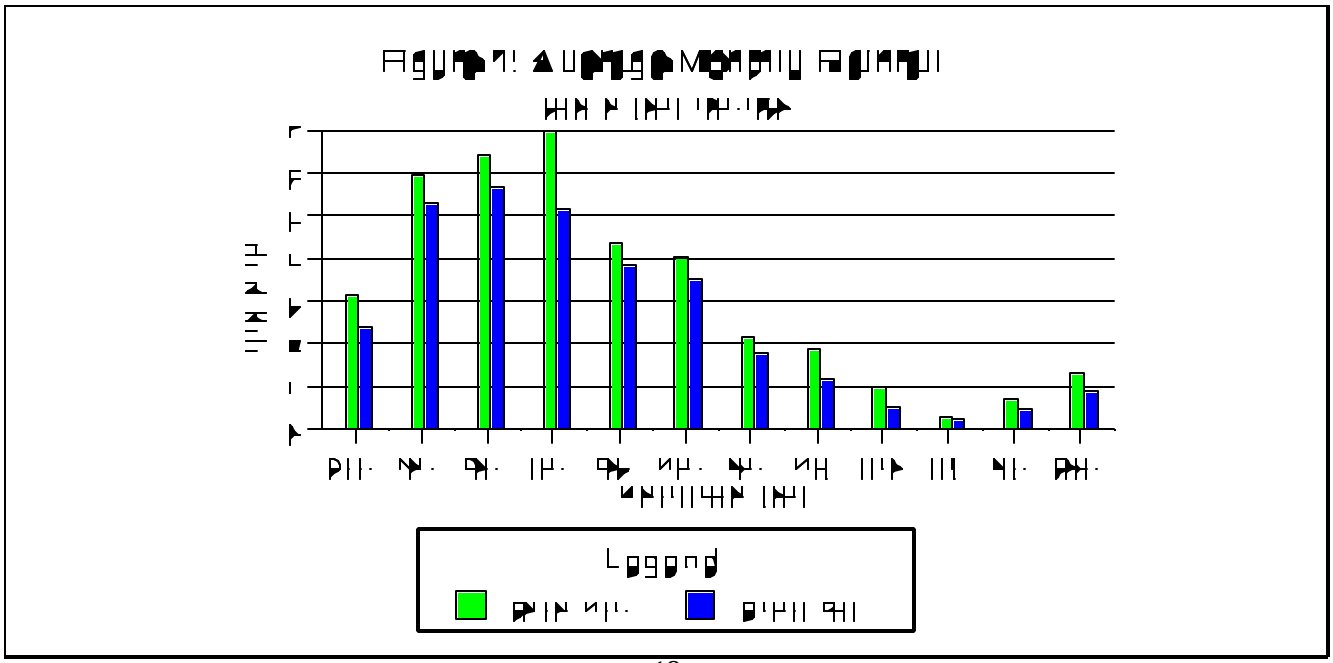
A. Purpose

The purpose of the current condition portion of the watershed analysis is to develop detailed information relevant to the key issues from step 2, and to document the current range, distribution, and condition of the core topics and other relevant ecosystem elements.

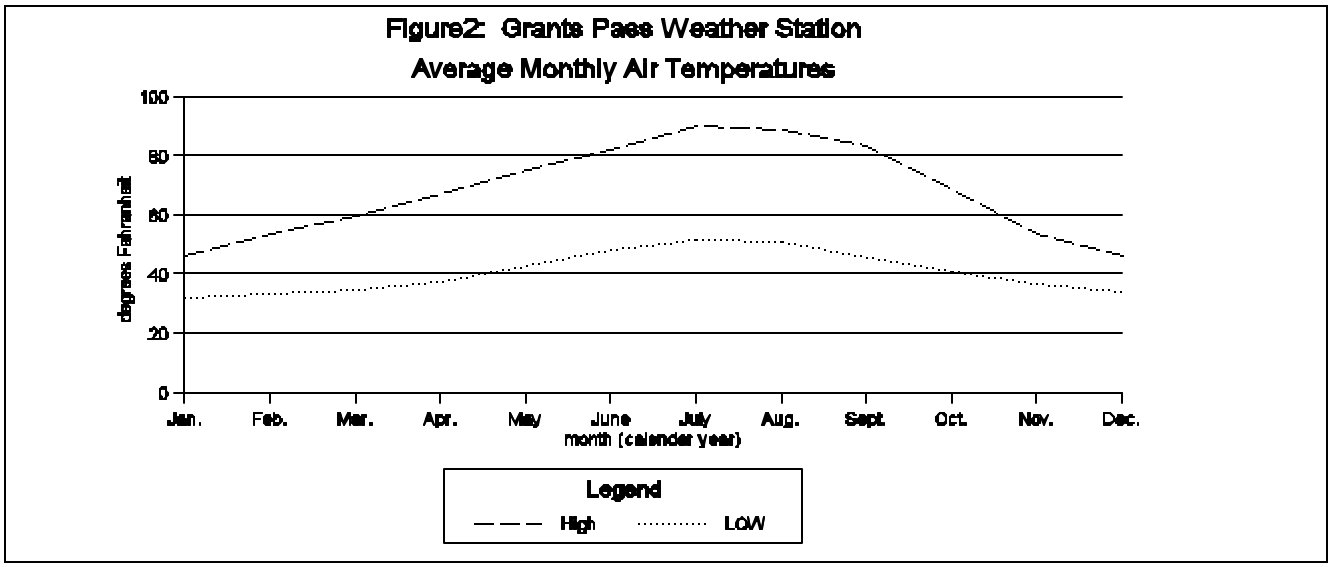
B. Climate

The Jumpoff Joe watershed has a Mediterranean climate with cool, wet winters and warm dry summers. Most of the precipitation is in the form of rain with only 5% located above 3,500 feet in elevation in the transient snow zone (TSZ). The transient snow zone is from 3,500 feet in elevation to 4,200 feet in elevation where shallow snowpacks accumulate and then melt throughout the winter in response to alternating cold and warm fronts (USDI BLM, 1993). Average annual precipitation in the Jumpoff Joe watershed ranges from approximately 30 inches to 54 inches. The least amount of rain falls in the southwest portion of the watershed near the town of Merlin. The greatest amount of precipitation falls in the northeast portion of the watershed at the highest elevations in the watershed.

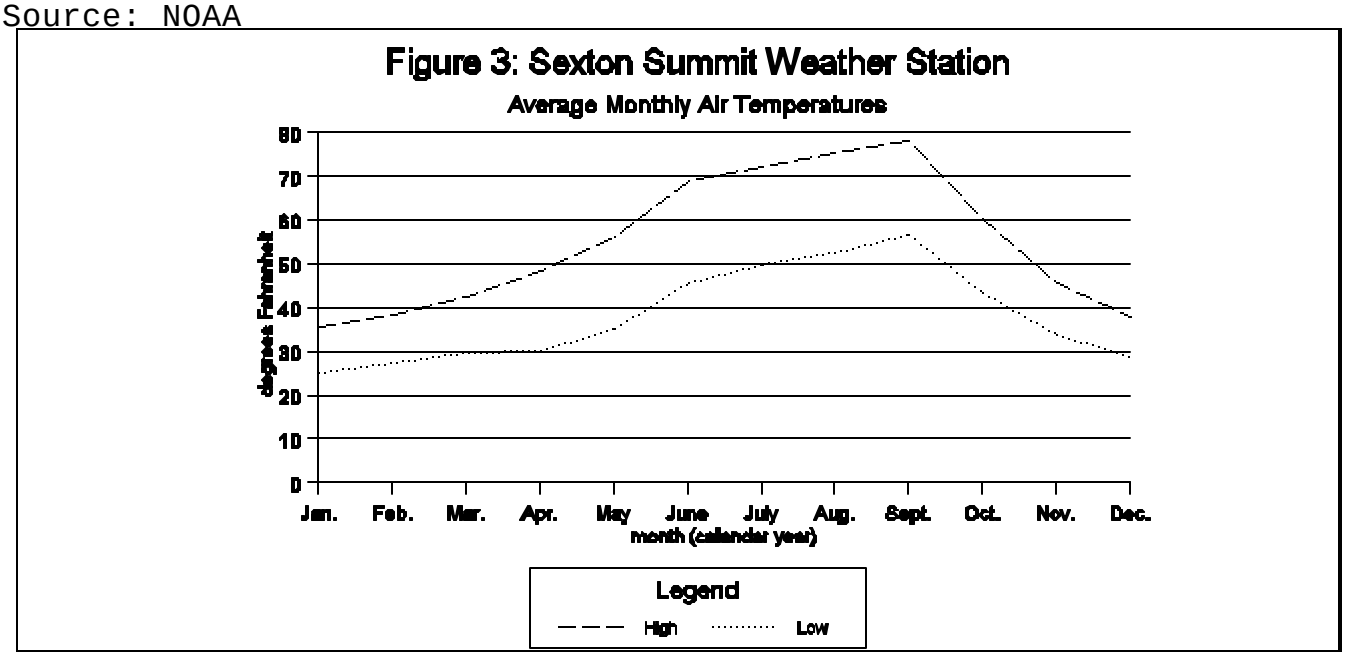
There is one National Oceanatic Atmospheric Administration (NOAA) Weather Station located within the Jumpoff Joe watershed. This is at the summit of Sexton Mountain at an elevation of 3,836 feet. Data from this



station has not been collected since 1992. The 30-year average (1951 through 1980) rainfall at Sexton Mountain is 38.14 inches. The average monthly rainfall for this period is shown in Figure 1. The average monthly air temperatures at Sexton Summit Weather Station are shown in Figure 3. The Grants Pass NOAA Weather Station, located at an elevation of 925 feet, is very close to the Jumpoff Joe watershed (approximately three miles from the boundary). The30-year average (1951-1980) rainfall at the Grants Pass Weather Station is 31.01 inches. The average monthly air temperatures at the Grants Pass Weather Station are shown in Figure 2.



Source: NOAA



Source: NOAA

C. Soils

1. Erosion Processes

"Erosion hazard" is an indication of a soil's susceptibility to particle or mass movement from its original location. Particle erosion hazard, concentrated flow (see Map 7) assumes a bare soil surface condition. If the soil is protected by vegetation, litter and duff, such that no mineral soil is exposed, concentrated flow erosion is not likely to occur and mass movement or streambank erosion is less likely to occur.

The dominant erosion process is concentrated flow erosion: gully, rill, and sheet. This form of erosion occurs when water accumulates on the soil surface predominately where there is little or no protective organic material. As the water flows downslope it builds energy which allows for detachment of soil particles that then travel as sediment in the flowing water. The sediment is then deposited where flow rates diminish.

The two types of areas that are particularly susceptible to concentrated flow erosion are: granitic soils, and soils of other parent materials on steep slopes.

a. Steep granitic soils - Siskiyou series (USDA, 1983)

These soils have low cohesion and tend to erode very easily when subject to concentrated flow. Siskiyou soil usually has thin surface duff layers that serve to protect the mineral soil (see Map 7). "Steep Granitic" Siskiyou soils (USDA, 1983) were developed from quartz diorite of the Grants Pass pluton (OR-DOGAMI, 1979). These soils are very highly erosive where there is no cover for protection. Siskiyou soils are also vulnerable to concentrated flow erosion because natural duff and litter cover is usually minimal, less than an inch. Also, the surface soil (top soil) is very thin and can be easily lost, leaving soil of minimal fertility with a poor ability to support regenerating vegetation.

These soils occur in mixed ownership in the watershed. (For location, see Map 7.) Some observation around Granite Hill at the south central edge of the watershed indicates soil losses due to erosion have been significant. Deep gullies on steep slopes near Interstate 5 appear to be caused by motorcycle use.

b. Steep soils derived from other minerals

These soils have a high erosion hazard due to the severity of the slope. The steep slopes give flowing water high erosive energy as it builds up speed running downslope. Conditions that are most conducive to concentrated flow erosion include road drainage outlets, unprotected road ditches, areas of bare soil usually created by ground disturbing activities or fire, wheel ruts on natural surface roads, and highly-altered ground surface created by OHV's or other motorized equipment. Areas of high road density, which allow for more intense ground

disturbance than would naturally occur, are usually indicative of this type of erosion.
Another process that occurs commonly in the watershed is streambank erosion. This is the loss of streambanks through sloughing, block failure, or scouring by high stream flows. Streambank erosion occurs as a result of increased stream peak flow combined with exposed deep, fine textured soil and/or poorly drained soils that make up the banks. Map 7 shows areas of soils with deep, fine texture or poorly drained that are most susceptible to streambank erosion. The watershed experienced a 20 to 30 year storm event in January, 1997.

Conditions generally worsen where new roads continue to be constructed and OHV activity continues. If roads are constructed with natural surface on side slopes with no seasonal control of wet season use, the problem is particularly pronounced (Road Density section below).

2. Forest Soil Productivity

Forest soil productivity is generated from several factors (Perry, D.A.; Meurisse, R.; Thomas, B.; *et al*., 1989.) These factors include:

a. Inherent soil characteristics such as depth, drainage, water holding capacity, mineral chemistry and bulk density. Climate is also part of this category.

b. Degree of development of organic matter within and on the soil. This includes large wood, duff and litter on the soil, humus (fine organic colloids) in the soil.

c. Abundance and diversity of beneficial soil organisms, *e.g*., mycorrhizae, certain bacteria, insects and fungi.

Within the Jumpoff Joe watershed these are serpentine influenced and steep granitic forest soil types that stand out with respect to forest soil productivity concerns.

Serpentine-influenced soils are at least partially developed from serpentine. Mineral chemistry is the greatest concern here. Serpentine is a greenish rock formed from metamorphic alteration of ultrabasic rock, particularly peridotite. It is made up primarily of magnesium silicate (Howie R.A., Zussman K., 1971). In the weathering, magnesium is released into the soil and dominates the cation exchange between plants and soil particles. Though magnesium is a plant nutrient, too much magnesium reduces forest growth rates by taking other nutrients' place (especially calcium). This also restricts the plant species that can survive compared to similar soils not developed from serpentine.

3. Deferred Watershed

In the Jumpoff Joe watershed, 3,397 acres in the upper Jumpoff Joe Creek subwatershed, upstream of Water Branch Creek, are included in deferred watersheds. These areas are identified as having high watershed cumulative effects from management activities, including timber harvest and other surface-disturbing activities. The area will be reevaluated during the next planning cycle or by January 2003. (USDI BLM 1995)

4. High Road Densities

Roads on sloping ground intercept surface water and shallow groundwater. The water is commonly routed by the road to a draw or other natural drainageway that is part of the natural stream system. This process causes drainage water to reach streams quicker than would naturally occur. The more roads that exist in a particular area, the more the potential increase of peak stream flow. With an increase of peak stream flow, streambanks are more susceptible to erode as the stream channel adjusts to the change in flow pattern. Additional stream sediment caused by this phenomenon predominately comes from eroded streambanks. Other sources for stream sediment are the road surface and eroded channels created by flows downslope from drainage outlets.

The above gives the general perspective on high road densities, however, road design and locations of the landscape produce varying effects. For example, an outsloped road with waterdips and a rocked surface would produce less effects than a lower slope natural surfaced road with ditches. This is because of differences in proximity to the stream system, degree of concentration/distribution of surface water flow due to road design, and differences in amount of protection of the road surface. In order to understand the comprehensive nature of road effects in the Jumpoff Joe watershed, a full analysis of all subwatersheds is needed of road densities and existing road conditions, design and location on the landscape.

D. Hydrology

There are approximately 596 miles of streams in the Jumpoff Joe watershed. Stream mileage was calculated for the two landscape analysis units (LAUs) separately: Joe Louse and Quartz Joe. Joe Louse landscape analysis unit contains upper Jumpoff Joe Creek, upper Louse Creek, and lower Louse Creek subdrainages. Quartz Joe landscape analysis unit includes Middle and lower Jumpoff Joe subdrainages.

Table III-1: Miles of Stream by Stream Order by LAU

Landscape Analysis Unit	Stream Orders							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Totals**
Joe Louse	106	109	41	17	19	1	0	293
Quartz Joe	86	121	54	16	11	10	5	303

Table III-1: Miles of Stream by Stream Order by LAU								
Landscape Analysis Unit	**Stream Orders**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Totals**
Totals	**192**	**230**	**95**	**33**	**30**	**11**	**5**	**596**

Source: Medford BLM GIS

Stream orders are defined by how many streams come together to create a larger stream. A stream that is at the headwaters and has no tributaries is a first order stream. When two first order streams flow together at the point that they join, the stream becomes a second order stream, etc.

First and second order streams in the watershed have a major influence on downstream water quality since they comprise approximately 71% of the total stream miles in the planning area. Beneficial uses supported by these streams include aquatic species and wildlife. Most first and second order streams in the watershed are characterized by intermittent stream flow, which are generally very narrow and V-shaped with steep gradients. Large woody debris, which dissipates stream energy and slows channel erosion, is a key component of these headwater streams. The amount of large woody debris in first and second order streams in the planning area has been greatly reduced as a result of harvest and prescribed burning. This loss of woody debris contributes to reduced channel stability and increased sediment movement downstream during storm events (USDI BLM 1994).

Third and fourth order streams comprise 21% of the stream miles in the watershed. Many of these streams support fish or directly contribute to the water quality of fish-bearing streams. Third and fourth order streams in the watershed are generally perennial, fairly narrow, have stream gradients less than 5%, and have U-shaped channels. During winter storms, these streams can move large amounts of sediment, nutrients, and woody material. Channel condition of these streams varies and depends upon the inherent channel stability and past management practices in the watershed. The amount of large woody debris contributed to these streams has been reduced by past management practices in the riparian areas (USDI BLM 1994).

Fifth order and larger streams make up 8% of the stream miles in the planning area. These streams support fish as well as other beneficial uses. Fifth order and larger streams tend to be wider, have flatter gradients, and a noticeable flood plain. Flood events play a major role in the channel condition of these larger streams. Actions on adjacent upland areas and on non-BLM administered land have adversely affected some of these stream segments (USDI BLM 1994).

Mature stands of trees along all streams on BLM-administered land generally contain trees of sufficient size to provide a future source of large woody debris. However, past practices such as salvage logging from stream channels, leaving low numbers of conifers in riparian areas, and removing debris jams to improve fish passage

have reduced the amount of large woody debris in fifth order and larger streams (USDI BLM 1994).

E. Water Quality

Water quality varies greatly throughout the watershed. The Oregon Department of Environmental Quality (DEQ) has monitored and/or collected water quality data from various sources on the streams and water bodies of the state. This information is captured in DEQ's 1988 Oregon Statewide Assessment of Nonpoint

Sources of Water Pollution. The BLM has performed very limited water quality testing in the Jumpoff Joe watershed, none of which is conclusive at this point in time.

1. Pollution

The following table was created from data from DEQ's 1988 assessment.

Table III-2: Nonpoint Water Pollution

Type of Water Quality	Jumpoff Joe Creek Condition	Louse Creek Condition
General	Moderate with supporting data	Severe with supporting data
Affecting fish	Moderate by observation	Moderate by observation
Affecting aquatic habitat	Moderate with supporting data	Severe with supporting data
Affecting water contact recreation or shellfish	Moderate by observation	Moderate by observation
Affecting drinking water supplies	Moderate by observation	No determination

(ODEQ, August 1988)

Jumpoff Joe Creek and Louse Creek from their mouths to their headwaters are considered water quality limited by the DEQ by the following criteria: flow modification, habitat modification, sediment and temperature.

Quartz Creek is designated as water quality limited for temperature from the mouth to its headwaters (DEQ 1997).

There is a considerable amount of mining in the Jumpoff Joe watershed, particularly in the upper and middle reaches of Jumpoff Joe and Louse Creeks. This contributes to stream turbidity and sediment.

2. Water Temperature

Many factors contribute to elevated stream temperatures in the Jumpoff Joe watershed. Low summer stream flows, hot summer air temperatures, low gradient valley bottoms, lack of riparian vegetation, and high channel width-to-depth ratios result in stream temperatures that can stress aquatic life. Natural disturbances that can affect stream temperature are climate (air temperatures), below normal precipitation (low flows), wildfire (loss of riparian vegetation), and floods (loss of riparian vegetation). Human disturbances affecting stream temperatures include water withdrawals, channel alterations, and removal of riparian vegetation through logging, grazing or residential clearing (USDI BLM 1997).

The DEQ has established that the seven-day moving average of the daily maximum shall not exceed the following values unless specifically allowed under a department-approved basin surface water temperature management plan:

- 64E F.
- 55E F. during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels
-

The BLM-monitored stream temperatures in the Jumpoff Joe watershed during the summer of 1996. The Oregon Department of Fish and Wildlife (ODFW) monitored stream temperatures in Quartz Creek in the spring through fall of 1994 and Louse Creek and lower Quartz Creek in the spring through the fall in 1996.

Table III-3: Maximum Daily Stream Temperature

Stream	Dates of 7-Day Maximum	Highest Temp. During 7-Day Maximum	Number of Days Exceeding 64 Degrees
Jumpoff Joe (Middle Reach)	7/24/96 through 7/30/96	77.9	80
Louse Creek (Middle Reach)	7/23/96 through 7/29/96	71.8	42
Louse Creek (Upper Reach)	7/24/96 through 7/30/96	64.4	10
Quartz Creek (@ the Mouth)	7/17/94 through 7/23/94	79.2	Not available
Quartz Creek (@ the Mouth)	7/26/96 through 8/1/96	77.0	Not available
Quartz Creek (Upper Reach)	7/18/94 through 7/24/94	68.8	Not available
Louse Creek (Near the Mouth)	7/10/96 through 7/16/96	78.9	Not available

Source: BLM and ODFW

3. Stream Flow

The stream flow in the Jumpoff Joe watershed fluctuates with the seasonal variation in rainfall. There are higher flows in the winter and early spring and very low flows in late summer and early autumn. Several reaches of Jumpoff Joe and Louse Creeks often have no water flowing in the late summer and early fall, particularly during years of low rainfall.

a. Peak Flow.

Maximum peak flows generally occur in December, January, and February. Records are available for Jumpoff Joe Creek for 1969 to 1992. The maximum discharge for the period of record was 13,500 cfs on January 15, 1974. The maximum recorded stream flow on Louse Creek (readings were only taken once a month) was 323 cfs on April 13, 1982.

Upland disturbances can result in increased magnitude and frequency of peak flows which may result in accelerated streambank erosion, scouring and deposition of streambeds, and increased sediment transport. The natural disturbance having the greatest potential to increase the size and frequency of peak flows is a severe, extensive wildfire. In the Jumpoff Joe watershed the primary human disturbances that can potentially affect the timing and magnitude of peak flows include roads, soil compaction (due to logging and agriculture) and vegetation removal (forest product harvest and conversion of sites to agricultural use). Quantification of these affects on stream flow in the Jumpoff Joe watershed is unknown. Roads quickly intercept and transport subsurface water and surface water to streams. A road altered hydrologic network may increase the magnitude of increased flows and alter the timing when runoff enters a stream (causing increased peak flows and reduced low flows). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams (USDI BLM 1997). Road densities per mile are listed for selected drainage areas in Table III-4.

Soil compaction resulting from yarding corridors, agriculture and grazing also affects the hydrologic efficiency within a watershed by reducing the infiltration rate and causing more rainfall to quickly become surface runoff instead of moving slowly through the soil to stream channels (USDI BLM 1997). Compacted acres for selected drainage areas are listed in Table III-4.

Vegetation removal reduces water interception and transpiration and allows more precipitation to reach the soil surface and drain into streams or become groundwater. Until the crown closures reach previous levels, it is considered to be hydrologically unrecovered. Rates of hydrologic recovery are site specific and depend on many factors including the type and extent of disturbance, soils, climate and rates of revegetation (USDI BLM 1993). Large amounts of vegetation removal in the transient snow zone are of particular concern due to alterations of the stream flow regime and resultant increased peak flow magnitudes (USDI BLM 1997). Equivalent clearcut acres (ECA) (unrecovered vegetation) and snow zone openings are shown in the following table. ECAs describe the acres within a particular subdrainage that do or will (in the foreseeable future and within the recovery period) exist

in a clearcut condition. The ECA is determined by adding the area actually in clearcut condition with an "equivalent" clearcut area for roads outside of clearcut units and partial or selective cut units. The drainage areas listed in the table constitute 41% of the Jumpoff Joe watershed.

The transient snow zone (TSZ) is the zone in which rain on snow will commonly fall. This is a moderate elevation that is between the common snow level and where rain is the usual form of precipitation. Table III-4 indicates that runoff from rain on snow in openings is not significant enough to create excessive runoff and thus high stream flows. This is because the area of openings does not appear to be large in relation to the subwatershed area.

Table III-4: Cumulative Effects of Selected Drainage Areas of the Jumpoff Joe Watershed (BLM and Non-BLM Lands)

Drainage Area	Total Acres	Acres in TSZ		Open Acres in TSZ		Equivalent Clearcut Acres		Compacted Acres		Road Densities (Miles/Section)
	Acres	Acres	%	Acres	%	Acres	%	Acres	%	
Fall Creek	1338	246	**18**	37	**15**	67	**5**	188	**14**	**5.2**
Orofino Creek	2291	365	**16**	93	**25.6**	318	**13.9**	317	**13.9**	**6.1**
Daisy Joe	3454	1180	**34**	508	**43**	239	**6.9**	622	**18**	**6.4**
Upper Louse Creek	7750	663	**9**	126	**18.9**	2292	**24.5**	1011	**12.8**	**11.9**
Quartz Creek	8602	0	**0**	0	**0**	844	**9.8**	450	**5.2**	**8.9**
Jack Creek	5205	575	**11**	8602	**2.2**	682	**13.1**	401	**7.7**	**11.7**

TSZ = Transient Snow Zone

b. Low Flow

Low summer flows in the Jumpoff Joe watershed reflect the low summer rainfall. Naturally low summer flows are exacerbated by periods of below normal rainfall. Jumpoff Joe Creek, and many other streams, have often dried up during years of below normal precipitation. The greatest need for water occurs during the summer months when demand for irrigation and recreation uses is highest (Lindell 1997).

The Oregon Water Resources Department (OWRD) has determined that:

> "The maximum economic development of this state, the attainment of the highest and the best use of the waters of the Middle Rogue River basin and the attainment of an integrated and coordinated program for the benefit of the state as a whole will be furthered through utilization of the aforementioned waters only for domestic, livestock, municipal, irrigation, agricultural

use, power development, industrial, mining, recreation, wildlife and fish life uses and the waters of the Middle Rogue River are hereby so classified with the following exceptions."

"The waters of Jumpoff Joe Creek and tributaries are classified only for domestic, livestock, irrigation of one-half acre noncommercial garden, industrial, mining during the period November 1 to May 1, power development and instream use for recreation, fish life and wildlife except for the use of stored water. Water stored between November 1 and March 31 of any year may be used for any purpose specified in Section A." (OWRD, 1989)

The following table contains established minimum perennial stream flow for Jumpoff Joe Creek from Louse Creek to the mouth established by the Rogue River Basin Program (ORWD, 1989).

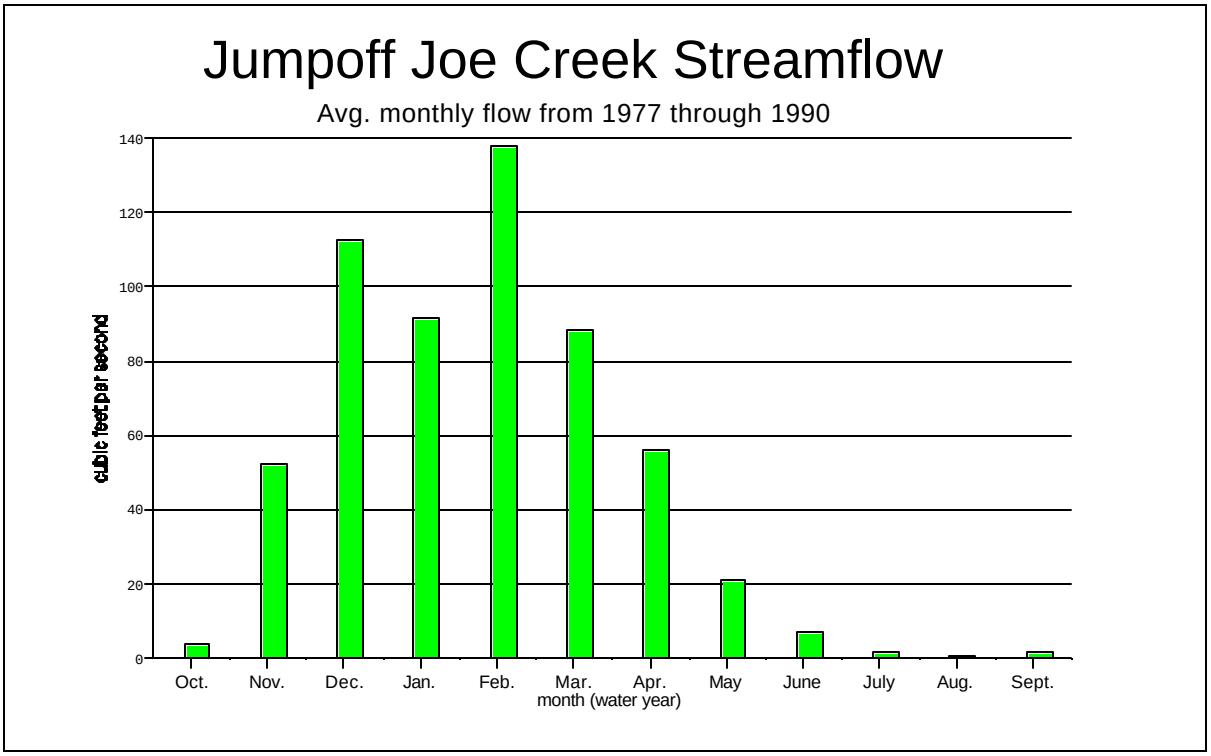
Table III-5: Minimum Perennial Stream Flow
Jumpoff Joe Creek (From Louse Creek to Mouth)

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
50/65	65	65	60	60	60	60	60	40	30/15	8	20/50

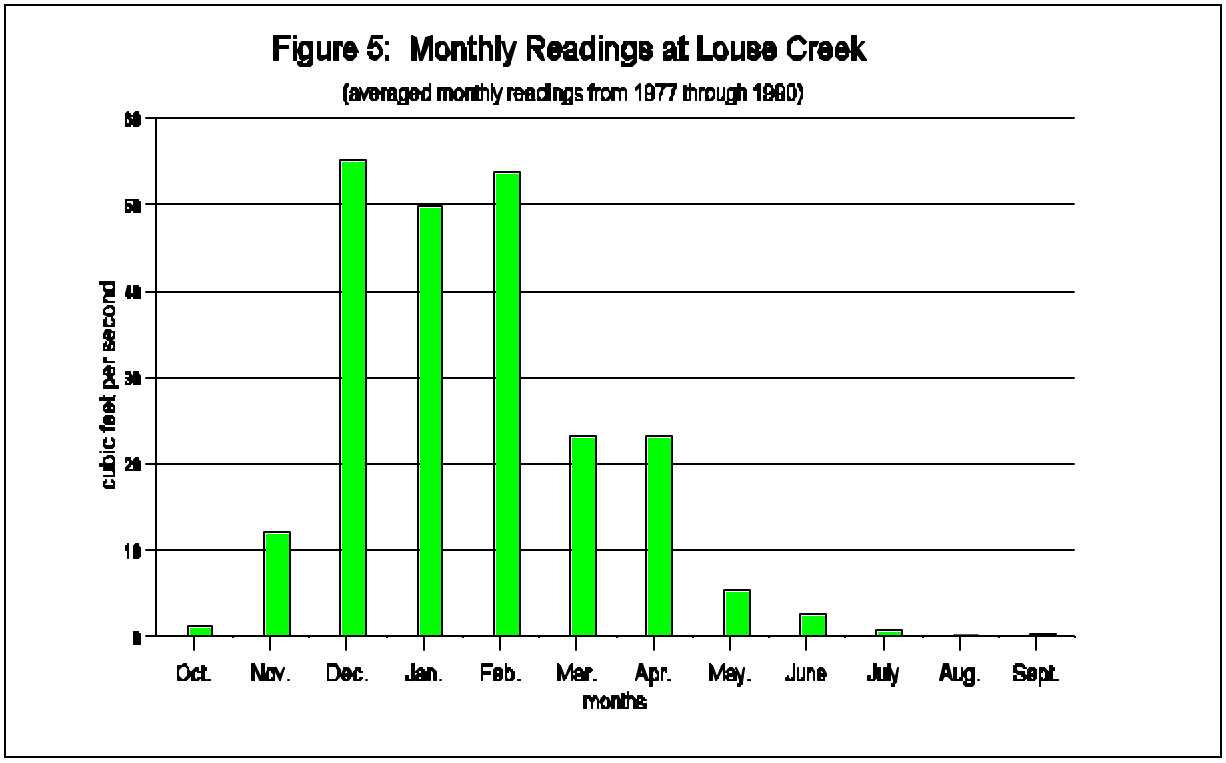
Measurements are in cubic feet per second (cfs)

The Oregon Water Resources Department maintained a gauging station on Jumpoff Joe Creek from December 1969 through April 1992.

Figure 4


Jumpoff Joe Creek Streamflow
Avg. monthly flow from 1977 through 1990
cubic feet per second
140
120
100
80
60
40
20
0
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
month (water year)

A non-recording staff gauge on Louse Creek was used to estimate stream flow from January 1970 through January, 1991. The estimates of stream flow of Louse Creek were not made on a regular basis. Some years there are only one or two readings, the highest number of readings in any one year is 12, approximately once a month. The estimations for this chart are not monthly averages. They are estimations that were made approximately once a month. One monthly reading in April, 1982 was *not* used in the calculations because it was a very high flow (323 cfs) that skewed the data to an unrepresentative peak. These monthly estimations were then averaged for the years 1977 through 1990. Therefore, only very general conclusions can be drawn from this data.



c. Sawdust Pile

In the upper part of Jumpoff Joe Creek (T34S, R4W, Section 30) there is a large (estimated 10,000 to 15,000 cubic yards) sawdust pile next to the creek created by a sawmill. The creek has been rerouted to the west of the pile where it flows today. The natural channel is located to the east of the pile. Standing water, in the form of pools, is located to the north and south of the sawdust pile.

There is a concern about water quality of the standing water. On April 24, 1998 water samples were taken from shallow groundwater (SGW) under the south edge of the pile and from a pool (PW) adjacent to the

south edge. Testing was comprised of a simple pH and a bioassay (performed by CH2M Hill). Results were as follows:

Sample	pH	Bioassay(LC50,,%)*	Dissolved Oxygen (mg/l)**(DO)
SGW	4.4	70.7	<3.0
PW	6.2	100+	<3.0

* Measurement of survival of *Ceriodaphnia dubia* at concentrations of sample in lab controlled water. For SGW, 50% of the organism would survive/die at 70.7% concentration of the sample.

** DO was measured just prior to the bioassay test. This is roughly half of the minimum standard for aquatic life under DEQ water quality regulations.

The samples were aerated prior to running the bioassay test, so the bioassay test does not reflect the low DO. The bioassay test was conducted about a week after sampling. DO may have been low upon sampling or may have been at higher levels when sampled.

The data indicates that there is a negative effect on water quality in relation to aquatic life under and around the sawdust pile. The pond water appears less directly affected than the shallow groundwater. However, the low dissolved oxygen measured in the pond water sample suggests a possibility of a negative effect.

d. Groundwater

(1) General

The Jumpoff Joe Creek watershed is underlain by metamorphosed volcanic and sedimentary rock, ophiolitic-complex rock, and rock of the granitic Grants Pass pluton. Narrow bands of alluvial sand and gravel mantle the bedrock along the stream drainages. The alluvial sediments are only locally saturated with groundwater and commonly do not constitute an aquifer. Thick alluvial terrace deposits are found along Jumpoff Joe Creek near the town of Merlin (also only locally saturated). Groundwater in the bedrock is contained within fractures in the rock. The fractures can be highly variable in distribution and typically supply only domestic quantities of water to wells. Where mapped, the groundwater surface mimics local topography, suggesting recharge to and discharge from the groundwater system are localized (personal communication, D. Woodcock).

Baseline information to assess the current status of groundwater quantity or quality is not available. Recent years of below normal precipitation have resulted in reduced recharge of groundwater supplies. Groundwater uses exempt from water rights include: stock watering, lawn or noncommercial garden watering of no more than 0.5 acres, and single or group domestic purposes for no more than 15,000 gallons per day. No information is available regarding the amount of exempt uses (USDI BLM 1997).

(2) Merlin Landfill

The City of Grants Pass was deeded title to the landfill from the BLM in 1997. Prior to that time they leased the site from BLM. Landfill operations are regulated by the Oregon DEQ, Waste Management and Cleanup Division, Solid Waste Section (SWS) (EMCON 1996).
The Merlin Landfill has impacted the groundwater beneath and immediately surrounding the landfill site to the north and southeast of the landfill.

As presented in the *Merlin Landfill Risk Evaluation* (EMCON 1992), chemicals-of-concern (COCs) for the site were identified by comparing maximum concentrations of analytes previously detected in groundwater, soil, surface water, and sediment to the U.S. Environmental Protection Agency's (EPA) established health-based criteria, primary drinking water maximum contaminant levels, secondary drinking water criteria, and EPA established water quality criteria. This information was presented to the DEQ during a meeting on December 1, 1992. COCs were not identified in soil, surface water, or sediment. The COCs identified for groundwater include the following:

Indicator Parameters	*Metals*
Chloride	Manganese
Total dissolved solids	Iron
	Barium

Volatile Organic Compounds	
Vinyl chloride	Trichloroethene
Carbon disulfide	1,4-Dichlorobenzene
Methylene chloride	*trans*-1,3-Dichloropropene
2-Butanone (MEK)	*cis*-1,2-Dichloroethene (*cis*-1,2-DCE)
Benzene	1,2-Dichloroethane

(EMCON 1997)

The city of Grants Pass is currently involved in investigations to evaluate the nature and extent of impacts to the environment by the Merlin Landfill. To date, three phases of investigative work have been completed under the regulatory authority of the SWS. The work has resulted in an extensive program of drilling, monitoring well installation and environmental monitoring (*i.e.*, surface water, groundwater, landfill gas). Off-site groundwater impacts have been documented north and southeast of the site (EMCON 1996).

Site characterization efforts have historically focused on areas north, and hydraulically down gradient of the landfill, where the largest number of residents live in the closest proximity to the site. North of the landfill, the perimeter of the plume of impacted groundwater has been characterized laterally to concentrations that are less than USEPA established primary drinking water maximum contaminant levels (MCLs) and secondary drinking water standards. The hydro-geologic investigation has also supported implementation of interim remedial measures (IRMs)

designed to reduce leachate generation within the landfill, intercept and treat impacted groundwater migrating north from the site, and provide residents to the north of the landfill an alternate source of drinking water. The purpose of the IRMs is to reduce the potential threat to human health, safety, welfare, and the environment north of the landfill (EMCON 1996).

Consistent with provisions of the real property lease agreement with BLM, the city constructed a groundwater recovery and treatment system in 1994. The system was designed to:

Accelerate the remedial process and to reduce the risk of exposure to residents living north of the landfill by impacted groundwater.

Capture and treat groundwater in the weathered gronodiorite/granodiorite aquifer impacted by VOCs to the north of the landfill in the area of the Merlin-Galice Highway.

Reduce the potential for VOCs to migrate beyond the capture zone of the recovery well field in the future.

Groundwater from the groundwater recovery and treatment system discharges under permit into the ephemeral stream north of the landfill. Based on average discharge quantities from the recovery wells, approximately 64,000 gallons per day (0.09 cfs) are released to the ephemeral stream (EMCON 1996).

F. Stream Channel

A system of stream classification developed by Rosgen is useful in interpreting various types of streams as to their sensitivity to disturbance and their recovery potential. The streams are classified by letter from A to G. The first letter determines the stream reach type, the number represents the channel material and the small case letter refers to the slope of the reach. Table III-6 provides a description of these stream classifications.

Table III-6: Rosgen Stream Classification

Stream Type	General Description	Landform/Soils/Features
Aa+	Very steep, deeply entrenched, debris transport, torrent streams.	Very high relief. Erosional, bedrock of depositional features; debris flow potential. Deeply entrenched streams. Vertical steps with deep scour pools; waterfalls.
A	Steep entrenched, cascading, step/pool streams. High energy/ debris transport associated with depositional soils. Very stable if bedrock or boulder dominated.	High relief. Erosional or depositional and bedrock forms. Entrenched and confined streams with cascading reaches. Frequently spaced, deep pools in associated step/pool bed morphology.

Table III-6: Rosgen Stream Classification

Stream Type	General Description	Landform/Soils/Features
B	Moderately entrenched, moderate gradient, riffle dominated channel, with infrequently spaced pools. Very stable plan and profile. Stable banks.	Moderate relief, colluvial deposition, and/or structural. Moderate entrenchment and width/depth ratio. Narrow, gently sloping valleys. Rapids predominate w/scour pools.
F	Entrenched meandering riffle/pool channel on low gradients with high width/depth ratio.	Entrenched in highly-weathered material. Gentle gradients, with a high width/depth ratio. Meandering, laterally unstable with high bank erosion rates. Riffle/pool morphology.

Table III-7: Rosgen Management Interpretations of Various Stream Types

Stream Type	Sensitivity to Disturbance	Recovery Potential	Sediment Supply	Streambank Erosion Potential	Vegetation Controlling Influence
A2	Very low	Excellent	Very low	Very low	Negligible
A3	Very high	Very poor	Very high	High	Negligible
A4	Extreme	Very poor	Very high	Very high	Negligible
B4	Moderate	Excellent	Moderate	Low	Moderate
B5	Moderate	Excellent	Moderate	Moderate	Moderate
B6	Moderate	Excellent	Moderate	Low	Moderate
F5	Very high	Poor	Very high	Very high	Moderate

In the Jumpoff Joe watershed preliminary site surveys were done and classification was determined from field data, topographic maps and photographs. Of the major streams, only three general stream classifications are present in the Jumpoff Joe watershed: A, B and F (Rosgen 1996). Information for Table III-8 was collected in two separate manners. For each reach only one field survey was done at one specific site within that reach. For example, in the Predominant Channel Material the information was gathered from only one specific site within that reach for that data. A representative site was chosen if possible. Sometimes a site was chosen because it was the only accessible site (usually because of private property). The first percentage number for gradient was determined from a topographical map. The second number was determined at the specific site using a clinometer. The coarse woody debris was determined by an ocular estimate at the survey site standing at the site and looking up and downstream, approximately 50 yards in each direction.

Table III-8: Hydrologic Condition

Stream Name/ Reach	Stream Reach Length (Miles)	Predominant Channel Material (Site)	Average Gradient Site--Reach	Coarse Woody Debris (Site - Approx. 100 Yds)		Rosgen Stream Classification
				In-stream	Riparian	
Bannister Creek Lower	1.9	Gravel	2%--1%	Low	None	B4c
Bummer Creek	1.9	Sand	3%--1%	Low	Low	B5c
Cove Branch Creek	3.28	Cobble	6%--7%	None	Low	A3
Ewe Creek	3	Silt	1%--1%	Low	Mod.	B6c
Jack Creek Lower	1.92	Gravel	2%--3%	None	None	B4b
Jack Creek Middle	0.94	Cobble	6%--7%	low	good	A3
Jack Creek Upper	1.13	Gravel	6%--9%	Low	Low	A4
Jump Off Joe Creek #1	3.7	Sand	0.5%--<1%	Low	Low	F5
Jump Off Joe Creek #2	3.8	Gravel	2%--1%	Low	Unknown	B4c
Jump Off Joe Creek Middle #3	2.94	Boulder	6%--7%	Low	Low	A2
Jump Off Joe Creek Upper #4	4.17	Gravel	2%--2%	Low	Low	B4
Louse Creek Middle	3.88	Gravel	4%--3%	None	None	B4
Louse Creek Upper	2.71	Cobble	3.5%--8.5%	None	Low	A3
North Fork Louse Creek	3.03	Cobble	17%--13%	Low	Good	A3a+
Quartz Creek Lower #1	1.4	Gravel	2%--2%	None	Mod.	B4c
Quartz Creek Middle #2	2.3	Gravel	1%--<1%	Low	Low	B4c
Quartz Creek Middle #3	3	Gravel	4%--2%	Low	Mod.	B4c
Quartz Creek Upper #4	2.1	Gravel	6%--8%	Low	Low	A4
Tunnel Creek Lower	1.2	Sand	1%--3%	Low	Low	B5c
Tunnel Creek Upper	1.4	Gravel	3%--9%	Mod.	Mod.	A4

There is a apparent lack of coarse woody debris in the stream channels. Coarse woody debris in streams contributes to the form and structure of a stream's channel. The woody debris may cause a stream to widen and become narrow, to deepen and become shallow, and stabilize and become unstable at different points along the

channel bed and banks. This diversity of channel form results in diversity of habitat for aquatic organisms (see Fish section). The coarse woody debris is particularly critical for the steep tributaries because it creates a stepped stream profile, with stream energy dissipated in relatively short, steep sections of the channel. Large woody debris also traps and slows the movement of sediment and organic matter through the stream system (USDI BLM 1997).

Substrate varies by the reach and stream throughout the Jumpoff Joe watershed. The information collected at specific stream sites is included in Table III-8. The lower elevation, low gradient stream reaches predominantly contain gravel, sand or silt. Sources of sediment in the Jumpoff Joe watershed appear to primarily come from road surfaces, fill slopes and ditchlines. Soil that moves into the ditchlines is carried to stream systems by ditch runoff. Drainage areas with high numbers of road stream crossings are likely to experience the most sediment movement into stream channels. The high energy types A and Aa+ streams are capable of transporting sediment to downstream reaches that support fish (USDI BLM 1997).

Roads are adjacent to many of the stream reaches within the Jumpoff Joe watershed. In addition to being a sediment source, these roads confine the stream channel and restrict the natural tendency of streams to move laterally. This can lead to down cutting of the streambed or erosion of the streambank opposite the road (USDI BLM 1997).

The trend for channel stability and condition should improve with additional large wood recruitment over the long term. Roads will continue to supply sediment, although maintenance and decommissioning would reduce the sediment source (USDI BLM 1997).

Undersized culverts can affect the stream channel by restricting stream flow . Culvert installation prior to 1992 in the Jumpoff Joe watershed was either designed for a 25 to 50 year flood event, or sized based on channel width and stream flow. Today's culverts are designed for a 100-year flood event to meet the Northwest Forest Plan and the Medford District RMP. During road inventories, existing culverts are evaluated for future replacement to meet the 100-year flood event.

G. Vegetation

1. Description

Data used to compile this section was collected in 1996. See Maps 13 and 14.

Table III-9: Major Plan Series (BLM Land) - 1996		
Major Plant Series	**No. Acres BLM**	**Percent of BLM/Watershed**
Douglas-fir	17,167	78.8 / 24.6
Jeffrey Pine	1,757	8.1 / 2.5
Non-timber	263	1.2 / 0.4
Ponderosa Pine	1,436	6.6 / 2.1
White Fir	792	3.6 / 1.1
White Oak	353	1.6 / 0.5
TOTALS	**21,776**	**100.0 / 31.2**

Table III-10: Major Plan Series (Non-BLM Land) - 1996		
Major Plant Series	**No. of Acres Non-BLM**	**Percent Non-BLM/Watershed**
Douglas-fir	26,192	54.7 / 37.6
Jeffrey Pine	803	1.7 / 1.2
Non-timber	9,200	19.2 / 13.2
Ponderosa Pine	8,478	17.7 / 12.2
White Fir	597	1.2 / 0.9
White Oak	2,656	5.5 / 3.8
TOTALS	**47,926**	**100.0 / 68.8**

Table III-11: Major Plan Series (BLM and Non-BLM) - 1996		
Major Plant Series	**Total Acres**	**Percent of Watershed**
Douglas-fir	43,367	62.2
Jeffrey Pine	2,560	3.7
Non-timber	9,463	13.6
Ponderosa Pine	9,914	14.2

Table III-11: Major Plan Series (BLM and Non-BLM) - 1996		
Major Plant Series	**Total Acres**	**Percent of Watershed**
White Fir	1,389	2.0
White Oak	3,009	4.3
TOTALS	**69,702**	**100.0**

Table III-12: Dominant Vegetation Condition Class (BLM Lands) - 1996		
Vegetation Condition Class	**No. of Acres BLM**	**Percent BLM/Percent Watershed**
Non-vegetated	62	0.3 / 0.1
Grass/forb	249	1.1 / 0.4
Shrub	52	0.2 / 0.1
Hardwood Woodland	1,336	6.1 / 1.9
Early Seral	796	3.7 / 1.1
Seedlings/saplings	2,792	12.8 / 4.0
Poles (5 to 11")	3,447	15.8 / 4.9
Large Poles (11 to 21")	7,553	34.7 / 10.8
Mature (+21")	5,489	25.2 / 7.9
TOTALS	**21,776**	**99.9*/31.2**

* Does not equal 100.0 due to rounding

Table III-13: Dominant Vegetation Condition Class (Non-BLM Lands) - 1996		
Vegetation Condition Class	**No. of Acres Non-BLM**	**Percent Non-BLM/Percent Watershed**
Non-vegetated	571	1.2 / 0.8
Grass/forb	6,483	13.5 / 9.3
Shrub	239	0.5 / 0.3
Hardwood Woodland	7,594	15.8 / 10.9
Early Seral	350	0.7 / 0.5

Table III-13: Dominant Vegetation Condition Class (Non-BLM Lands) - 1996		
Vegetation Condition Class	**No. of Acres Non-BLM**	**Percent Non-BLM/Percent Watershed**
Seedling/sapling	1,384	2.9 / 2.0
Poles (5 to 11")	20,394	42.6 / 29.3
Large Poles (11 to 21")	10,653	22.2 / 15.3
Mature	258	0.5 / 0.4
TOTALS	**47,926**	**99.9*/68.8**

* Does not equal 100.0 due to rounding

Table III-14: Dominant Vegetation Condition Class (BLM and Non-BLM Lands) - 1996		
Vegetation Condition Class	**Total Acres**	**Percent of the Watershed**
Non-vegetated	633	0.9
Grass/forb	6,732	9.7
Shrub	291	0.4
Hardwood Woodland	8,930	12.8
Early Seral	1,146	1.6
Seedling/sapling	4,176	6.0
Poles (5 to 11")	23,841	34.2
Large Poles (11 to 21")	18,206	26.1
Mature	5,747	8.2
Totals	**69,702**	**99.9***

* Does not equal 100.0 due to rounding

The plant series listed below were identified and mapped within the Jumpoff Joe watershed. Site productivity in terms of basal area per acre is described for each series. Basal area is defined as the area of the cross section of a tree stem near its base, generally at breast height, 4.5 feet above the ground and inclusive of bark (USDI BLM 1994).

Douglas-fir (*Pseudotsuga menziesii* ((Mirb.) Franco.))

Jeffrey pine	(*Pinus jeffreyi* (Grev. & Balf.))
Ponderosa pine	(*Pinus ponderosa* (Laws.))
White fir	(*Abies concolor* ((Gord. & Glend.) Lindl.))
Western hemlock	(*Tsuga heterophylla* (Raf.) Sarg.)
White oak	(*Quercus garryana* (Dougl.))

2. Site Productivity

The following basal area production rates are on a per acre basis. Basal area in a plant series is not limited to the tree species that series is named for. For example, basal area in the Douglas-fir series can be from Douglas-fir, madrone, sugar pine, or any other tree species present on the site. Basal area is used as a relative measure of site productivity. For example, an area that can support 200 square feet of basal area / acre is more productive than an area that can support 100 square feet of basal area / acre.

Douglas-fir is the most common tree species in southwestern Oregon. Sites within the Douglas-fir series average 254 square feet of basal area / acre (Atzet and Wheeler 1984). Douglas-fir tends to produce conditions that favor fire wherever it occurs. This species is self-pruning, often sheds its needles and tends to increase the rate of fuel buildup and fuel drying (Atzet and Wheeler 1982).

The Jeffrey pine series is confined to areas of ultrabasic (serpentine and serpentine-influenced) soils (Atzet and Wheeler 1982). Serpentine areas dominated by Jeffrey pine may have the lowest productivity of any conifer series in the Klamath Province with an average basal area per acre of 83 square feet (Atzet and Wheeler 1984). While not considered important in terms of timber production, these sites are floristically diverse supporting many special status plants. They also have value as unique habitats for a variety of wildlife species.

Forests in the Ponderosa pine series average approximately 170 square feet of basal area. This series is relatively rare as Ponderosa pine does not often play the role of a climax dominant (Atzet and Wheeler 1984). This series tends to occupy hot, dry aspects that burn frequently. Ponderosa pine regeneration is restricted by reducing the number of fire events. Due to the success of fire suppression over the last 70 years, overall cover of this series has decreased (Atzet and Wheeler 1982).

Western hemlock is present in the Jumpoff Joe watershed (T34S, R5W, Section 13). This species grows in cool, moderate environments where moisture stress occurs late in the growing season (Atzet and McCrimmon 1990). Evapotranspirational demands are low. The average basal area for this series is 295 square feet. The fire regime is one of infrequent, high-intensity fires.

Sites in the white fir series are also considered productive with basal area averaging over 341 square feet (Atzet and Wheeler 1984). The white fir series is widespread, diverse and productive (Atzet and McCrimmon 1990).

White fir's thin bark provides little insulation during low-intensity underburns until tree diameter reaches at least eight inches. Moreover, the tolerant nature of white fir, which allows branches to survive close to the ground, makes the lower crown a ladder to the upper crown (Atzet and Wheeler 1982). Due to the success of fire suppression efforts over the last 70 years, white fir occupancy has increased.

The white oak series occurs at low elevations and is characterized by shallow soils. Although Oregon white oak is usually considered a xeric species, it also commonly occurs in very moist locations - on flood plains, heavy clay soils, and on river terraces. On better sites, white oak is out competed by species that grow faster and taller (Stein 1990). Average basal area is 46 square feet. Water deficits significantly limit survival and growth (Atzet and McCrimmon 1990). White oak has the ability to survive as a climax species as it is able to survive in environments with low annual or seasonal precipitation, droughty soils, and where fire is a repeated natural occurrence (Stein 1990). Fire events in this series are high frequency and low intensity (Atzet and McCrimmon 1990). Due to the effectiveness of fire suppression over the last 70 years, the prominence of this series has declined.

3. Landscape Patterns

In the Joe Louse subwatershed, the dominant plant series is Douglas-fir. White fir is present in the east and northeast part of this watershed. The western hemlock series has disappeared from the watershed (T35S, R5W, Section 1) but there was a western hemlock sighting in T34S,R5W, Section 13. The hemlock in Section 1 was listed as a timber sale volume in 1947. A possible reason for the loss of the hemlock from this section is change in environmental conditions such that western hemlock no longer had a competitive advantage after the logging occurred. (The site became hotter and drier after an estimated 30 MBF per acre was harvested. The plant series is currently listed as Douglas-fir.)

The Quartz Joe subwatershed is predominately Ponderosa pine, white oak and non-forest. The Douglas-fir series is found in the northwest and north portions of the subwatershed with the rest of the subwatershed having vegetation consistent with the hotter dryer conditions typical of inland valleys.

The Joe Louse subwatershed is primarily the Douglas-fir series. The westernmost portion of this subwatershed is a continuation of the inland valley vegetation of Quartz Joe subwatershed (Ponderosa pine, white oak, and non-forest) and transitions into the Douglas-fir series near the west boundary of R5W. Inclusions of the white fir series occur at higher elevations and on more mesic sites.

Most of the Jumpoff Joe watershed is densely stocked pole stands. Sixty percent of the Jumpoff Joe watershed stands with an average diameter between 5 and 21 inches.

4. Vegetation Data

Additional analysis of current vegetative conditions will be necessary to prescribe forest management activities. Plant series data needs to be combined with vegetative condition class to determine management opportunities. For example, information on the amount of acres in the Douglas-fir series is available as is information on the amount of pole stands, but not Douglas-fir pole stands. A second example could be acres of Ponderosa pine and white oak being encroached upon by Douglas-fir that require restoration treatments.

Present indications are that the watershed will require extensive density management (thinning) in both natural and planted stands. General objectives for the thinning include reduction of total number of stems, species selection to provide a species mix that more closely resembles that which was thought to occur prior to fire exclusion and logging, and fuels management (prescribed fire) to reduce the activity fuels (slash) crated via the density management.

H. Human Use

1. Socioeconomic Overview

Current human use of the watershed includes, but is not limited to, harvesting of forest products, mining, ranching and dispersed recreation.

The primary residents within the watershed include retirees, rural residents that commute between their residence and work in Grants Pass and Medford, and several business owners with businesses related to industry and tourism. The population is increasing with many newcomers moving into the area. The area is growing as an outlying community for the City of Grants Pass.

The Jumpoff Joe watershed ranks second among watersheds in the Grants Pass Resource Area in the amount of private land in the rural interface area (RIA). There are 20,548 acres of private land (zoned in 1-5 acre lots and 6-20 acre lots) within one-half mile of BLM-administered land. The BLM manages 10,347 acres within one-half mile of private RIA land in this watershed, which ranks third in the resource area (USDI BLM 1994).

Interstate 5, a major north/south interstate in the northwest, dissects the watershed. Towns in the watershed include Merlin, located in the southwest section of the watershed and Hugo, located in the northwest portion of the watershed. Other areas of business, industrial and residential development are concentrated between Merlin and Hugo and southwest of Merlin along Azalea Drive, Ewe Creek Road, and Robertson Bridge Road. There are also scattered residences along Merlin-Galice Road both east and west of Merlin. Monument Drive, which runs parallel to the interstate, also supports residences as well as small businesses and light industry. To the east of the interstate, human settlement is located in the area of Granite Hill, Winona Road and Donaldson Road. There is a high concentration of population and development in the Colonial Valley area which is located in the

southeast part of the watershed.

2. Recreation

Recreational use of the area is dispersed and includes off-highway vehicle (OHV) use, hunting, mountain biking, equestrian use and driving for pleasure. There are currently many nondesignated trails and footpaths in the area. A portion of the Quartz Creek off-highway vehicle area is located in the northwest part of the watershed. The area consists of 7,160 acres which are designated by the Medford District RMP for OHV use. Use is limited to existing roads and trails. The BLM is currently working with local user groups to map trails and coordinate rehabilitation projects in the area. The Galice Hellgate Back Country Byway passes through the southwestern portion of the watershed. This nationally-designated driving tour begins in Merlin and continues to Grave Creek and branches off at Galice Creek as well. The byway provides opportunities for exploring the Wild and Scenic Rogue River area by motorized vehicle.

3. Roads

Some roads in the Jumpoff Joe watershed have been constructed based on the public's need for access. Many of these roads are on private lands, natural surfaced, lack appropriate drainage structures, and need to be inventoried for potential decommissioning or improvements. The midslope and low elevation natural surfaced roads are a source of erosion and sedimentation into streams. The BLM has no authority over private roads and private land use.

Road construction and improvement across BLM-managed lands were based mainly on timber management as directed under Federal O&C land management. Many natural surfaced roads remained open for administrative access after timber sales were completed. These roads are known to be a source of erosion and sedimentation into streams. BLM roads are managed and inventoried for potential decommissioning and/or improvements to help reduce sedimentation into neighboring streams.

Culvert installation, prior to 1992, in the Jumpoff Joe watershed were either designed for a 25 to 50 year flood event or sized based on channel width and stream flow. Today's culverts are designed for a 100- year flood event to meet the Northwest Forest Plan and the Medford District RMP. During road inventories, existing culverts are evaluated for future replacement to meet the 100-year flood event.

The Jumpoff Joe watershed varies in road density and type of roads within the drainage area. The average road density across lands other than BLM in the Jumpoff Joe watershed is 8.29 miles per square mile. The average BLM road density in the Jumpoff Joe watershed is 4.63 miles per square mile of BLM land. The BLM continues to analyze and inventory BLM-controlled roads in an attempt to improve the roads and/or reduce road densities to a level appropriate for land management and the environment. Table III -15 shows the miles of road by surface

type for BLM and non-BLM roads in the watershed.

Table III-15: Road Information by Surface Type

Road Ownership	Surface Type	Miles
BLM	Natural (NAT)	61.73
BLM	Pit Run Rock (PRR)	30.69
BLM	Grid Rolled Rock (GRR)	16.07
BLM	Aggregate Base Coarse (ABC)	14.94
BLM	Aggregate Surface Coarse (ASC)	28.09
BLM	Bituminous Surface Treatment (BST)	6.12
Private & Other Agencies	Unknown/Various Types (UNK)	620.68
	Total Road Miles:	778.32

4. Minerals

An inventory, utilizing the mining claim microfiche prepared by the BLM Oregon State Office, revealed that there are approximately 100 mining claims currently existing within the watershed. There is a fairly even mix of lode claims and placer claims, and there are some millsite claims within the watershed.

On the lands administered by the BLM there are three levels of operations that may occur. The lowest level of operations is considered casual use. Casual use operations include those operations that usually result in only negligible disturbance. These types of operations usually involve no use of mechanized earthmoving equipment or explosives, and do not include residential occupancy. No administrative review of these types of operations is required. The number of casual users in this category are not known.

The most common level of operations involve activities above casual use and below a disturbance level of five acres. This level of operations requires the operator to file a mining notice pursuant to the BLM Surface Management Regulations. The mining notice informs the authorized officer of the level of operations that will occur, the type of existing disturbance at the location of the operations, the type of equipment to be used in the mining operations, and the reclamation plans following the completion of the mining activities.

Mining notices involve an administrative review of access routes used in the mining operations and a review to determine if unnecessary or undue degradation may occur as a result of the mining operations. Approximately one dozen mining notices have been submitted for operations proposed to occur on the BLM-administered lands within the watershed.

A plan of operations may be required for mining operations that meet any of the following criteria:

a. Proposed operations that may exceed the disturbance level of five acres;

b. Activities above casual use in specially-designated areas such as areas of critical environmental concern (ACEC), lands within an area designated as a wild or scenic river, and areas closed to off-highway vehicle use; and

c. Activities that are proposed by an operator who, regardless of the level of operations, has been placed in noncompliance for causing unnecessary or undue degradation.

The review of plans of operations involves a NEPA environmental review to be completed no later than 90 days from the date of the submission of the plan. No plans of operations exist within the watershed at this time.

In addition to federal laws mining claimants must comply with state laws where applicable:

a. The Department of Environmental Quality monitors and permits dredging activities and activities where settling ponds are used.

b. The Department of Geology and Mineral Industries (DOGAMI) permits all activities over one acre in size and ensures reclamation is completed in a timely manner. DOGAMI requires reclamation bonds where applicable.

c. The Department of State Lands permits instream activities where the removal, or displacement, of 50 cubic yards of material is anticipated and where the movement of a stream channel is planned.

d. The Department of Fish and Wildlife (ODFW) monitors turbid discharges from mined sites. ODFW also recommends preferred dredging periods for operations within anadromous fish bearing streams. ODFW also approves variances for operations outside the preferred work periods where applicable.

5. Surface Uses of a Mining Claim

In some instances the surface of the mining claim is managed by the claimant. These are usually claims that were

filed before August 1955 and determined valid at that time. The claimants in these cases have the same rights as outlined above. However, they have the right to eliminate public access across that area where they have surface rights. There are two instances within the watershed where the claimants have surface rights. These rights are outlined in Appendix B.

6. Mineral Potential

Mineral potential is defined in the Medford District RMP (Chapter 3, pg. 102) as low, moderate or high (USDI BLM 1994). The mineral potential maps (Maps 17a and17b) show there is a moderate potential for chromite within the east portion of the watershed. The remainder of the watershed has a low potential for minerals.

7. Current Physical Condition Resulting from Past Mining Activities

The existing physical condition of all areas within the watershed that have been mined are in various conditions. The areas mined on BLM lands on upper Jumpoff Joe Creek appear to be in moderate condition. Most of the BLM lands mined there have been adequately reclaimed where operations have been terminated. The riparian areas along Jumpoff Joe Creek that exhibit the most damage are private lands. The existing mining operation on Jack Creek has left the creek in poor to moderate condition.

The remainder of the watershed is in moderate condition as a result of past mining activities.

8. Cultural Resources

There are no recorded cultural sites within the watershed. Some areas were surveyed during proposed ground disturbance activities over the years such as timber sales, road construction, and other projects.

9. Lands/Realty

The land pattern of BLM ownership within the watershed is mostly a scattered mosaic. In general, the land patterns have been molded, first by the alternate section pattern of O&C railroad revestment land and, since then, by the transfer of public lands from the United States to various private landowners through several different Congressional Acts. This left the lands owned by the United States and administered by the BLM scattered with access nonexistent in some cases. This also leaves the private landowners with access problems and needs that entail rights-of-way across BLM-administered lands.

Rights-of-way issued to private landowners include roads, water systems, powerlines (including a 500 kv aerial power transmission line), phone lines, communication sites and a buried high pressure natural gas pipeline. The actual locations of these rights-of-way can be found in Master Title Plats kept updated at the Medford District

Office.

There are two occupancy leases within the watershed issued to resolve long-standing occupancy trespasses.

10. Merlin Landfill

DEQ has characterized the landfill as a required mitigation on site to minimize or eliminate the discharge of toxics into the groundwater sources at, and adjacent to, the landfill. DEQ is also developing a closure plan for the landfill which will include capping the site and taking measures to ensure that the site does not contaminate future groundwater sources or cause long-term health concerns. (Also see Stream Flows section in Current Condition for more information on the Merlin Landfill.)

11. Illegal Dumping

Illegal dumping occurs throughout the watershed. Dump cleanup contracts are let annually within the watershed with annual costs of approximately $2,000 a year for cleanup. Some measures such as road gating and blocking have deterred dumping and may be important long-term measures to eliminate this problem. Law enforcement activities can deter dumping if citations are issued with publicity in the local papers.

I. Fire Management

1. Fundamental Changes to the Fire Regime

The historic fire regime for the watershed has been that of a low-severity regime. This regime is characterized by frequent fires of low intensity. The exclusion of fire occurrence (both natural and prescribed) has lead to a shift in the fire regime to an unnatural, high-severity regime where fires are infrequent, usually high intensity, and cause stand replacement. Where natural high-severity fire regimes normally occur (*e.g.*, northern Cascades or Olympic Mountains), fire return intervals are long and usually associated with infrequent weather events such as prolonged drought or east wind, low humidity events and lightning ignition sources. Southern Oregon and the Jumpoff Joe watershed has the same weather conditions and topography that created the former low-severity fire regime. The only change in the fire environment has been the fuel conditions created since the removal of frequent fire. This has caused a vegetation shift to dense, overstocked stands of less fire resistant species, with an increase in dead and down fuels. Simultaneously, a dramatic increase in human ignition sources has occurred. This has created a current condition for large, increasingly destructive, difficult to suppress wildfire with the capability to destroy many of the resource and human values present in the watershed. The Walker Mountain Fire in 1988 is an example. This fire burned over 2,100 acres and was nearly 90% high intensity, stand replacement fire. Homes were threatened with destruction for nearly a week before suppression forces could control the spread of the fire.

2. Current Condition

The data collected for the watershed for hazard, ignition risk, and values at risk for loss from wildfire are summarized in Tables III-16 through III-17. Tables are shown for the Joe Louse LAU and Quartz Joe LAU, and then these are combined in tables for the entire Jumpoff Joe watershed. Ratings are displayed on Maps 18a-20b. Rating classification criteria are summarized in Appendix F.

Hazard, risk and value at risk are conditions that are used to better understand and plan for potential fire management problems and identify opportunities to manage the watershed to meet goals, objectives and desired future conditions. Wildfire occurrence can often prevent the successful achievement of short-term and mid-term land management goals and objectives. Stand replacement wildfire can prevent the development of mature and late-successional forest conditions as well as convert existing mature forests to early seral forests.

Table III-16: Hazard Classification Joe Louse LAU

Ownership	Acres	High Hazard Acres/Percent		Moderate Hazard Acres/Percent		Low Hazard Acres/Percent	
BLM	13,974	5,508	39%	6,907	49%	1,559	11%
Other Ownership	19,705	11,022	56%	8,394	43%	289	1%
Total	**33,679**	**16,530**	**49%**	**15,301**	**45%**	**1,848**	**5%**

Vegetation, dead and down fuel conditions in the Joe Louse portion of the watershed have only 6% of the area in a low hazard condition and half in a high hazard condition.

Table III-17: Risk Classification Joe Louse LAU

Ownership	Acres	High Risk Acres/Percent		Moderate Risk Acres/Percent		Low Risk Acres/Percent	
BLM	13,974	4,565	33%	6,747	48%	2,662	19%
Other Ownership	19,705	15,156	77%	3,942	20%	607	3%
Total	**33,679**	**19,721**	**59%**	**10,689**	**32%**	**3,269**	**10%**

Risk is defined as the source of ignition. Human population and use within this portion of the watershed creates high risk for wildfire occurrence.

Table III-18: Value at Risk Classification Joe Louse LAU

Ownership	Acres	High Value Acres/Percent		Moderate Value Acres/Percent		Low Value Acres/Percent	
BLM	13,974	6,388	46%	6,495	46%	1,091	8%
Other Ownership	19,705	10,830	55%	8,410	43%	465	2%
Total	**33,679**	**17,218**	**51%**	**14,905**	**44%**	**1,556**	**5%**

Values at risk are the resource and human values for components of the watershed. The watershed has over half of the area in high values. This is due largely to the amount of private lands, especially residential areas.

Table III-19: Acres of High Rating in Hazard, Risk and Values at Risk - Joe Louse LAU

Ownership	Acres	High Concern Areas Acres/Percent	
BLM	13,974	**596**	**4%**
Other Ownership	**19,705**	**4,643**	**24%**
Total	**33,679**	**5,239**	**16%**

Table III-19 and Maps 21a and 21b indicate the lands which have been classified as high in all three factors (hazard, risk, and value at risk). The 16% total amount in this portion of the watershed is a high percentage. It is especially critical in the Shanks, Jumpoff Joe and Louse Creek areas.

Table III-20: Hazard Classification Quartz Joe LAU

Ownership	Acres	High Hazard Acres/Percent		Moderate Hazard Acres/Percent		Low Hazard Acres/Percent	
BLM	7,802	4,242	54%	3,387	43%	173	2%
Other Ownership	28,221	17,292	61%	10,194	36%	735	3%
Total	**36,023**	**21,534**	**60%**	**13,581**	**38%**	**908**	**3%**

The Quartz Joe portion of the watershed has vegetation and dead/down fuel conditions that have shifted to large amounts of the area in high hazard conditions. Much of this is a result of the large acreage in less than mature vegetation classes.

Table III-21: Value at Risk Classification Quartz Joe LAU

Ownership	Acres	High Risk Acres/Percent		Moderate Risk Acres/Percent		Low Risk Acres/Percent	
BLM	7,802	7,081	91%	690	9%	31	0.4%
Other Ownership	28,221	27,803	99%	418	1%	0	0%
Total	**36,023**	**34,884**	**97%**	**1,108**	**3%**	**31**	**0.1%**

The high level of human population within this portion of the watershed creates the high amount of risk for wildfire occurrence. Risk is at an extreme level.

Table III-22: Acres of High Rating in Hazard, Risk and Values at Risk Quartz Joe LAU

Ownership	Acres	High Value Acres/Percent		Moderate Value Acres/Percent		Low Value Acres/Percent	
BLM	7,802	3,528	45%	3,209	41%	1,065	14%
Other Ownership	28,221	22,493	80%	4,518	16%	1,210	4%
Total	**36,023**	**26,021**	**72%**	**7,727**	**21%**	**2,275**	**6%**

Seventy-two percent is a large amount of land classified as high value. This is the result of the amount of private lands, especially residential areas.

Table III-23: Acres of High Rating in Hazard, Risk and Values at Risk - Quartz Joe LAU

Ownership	Acres	High Concern Areas Acres/Percent	
BLM	7,802	1,064	14%
Other Ownership	28,221	12,809	45%
Total	**36,023**	**13,873**	**39%**

Almost 40% of the LAU rates are as high in all three factors. This indicates that wildfire occurrence in this LAU will have an extremely negative effect on resources. These areas need to be considered as priority areas for management actions and activity that will decrease the potential for large stand replacement wildfire occurrence.

Table III-24: Hazard Classification Jumpoff Joe Watershed (Quartz Joe + Joe Louse)

Ownership	Acres	High Hazard Acres/Percent		Moderate Hazard Acres/Percent		Low Hazard Acres/Percent	
BLM	21,776	9,750	45%	10,294	47%	1,732	8%
Other Ownership	47,926	28,314	59%	18,588	39%	1,024	2%
Total	**69,702**	**38,064**	**55%**	**28,882**	**41%**	**2,756**	**4%**

For the Jumpoff Joe watershed as a whole, hazard is disproportionately in the high and moderate classes. The trend in fuel and vegetation shifting to increasingly high hazard conditions will continue over the next several decades to create increasingly high fuel hazard. Within the next 10 to 15 years it is anticipated that 75% or more of the watershed will be in high hazard if the situation is not changed.

Table III-25: Risk Classification Jumpoff Joe Watershed (Quartz Joe + Joe Louse)

Ownership	Acres	High Risk Acres/Percent		Moderate Risk Acres/Percent		Low Risk Acres/Percent	
BLM	21,776	11,646	53%	7,437	34%	2,693	12%
Other Ownership	47,926	42,959	90%	4,360	9%	607	1%
Total	**69,702**	**54,605**	**78%**	**11,797**	**17%**	**3,300**	**5%**

The high level of human population and use within the Jumpoff Joe Louse watershed creates an extremely high risk for wildfire occurrence.

Table III-26: Value at Risk Classification Jumpoff Joe Watershed (Quartz Joe + Joe Louse)

Ownership	Acres	High Value Acres/Percent		Moderate Value Acres/Percent		Low Value Acres/Percent	
BLM	21,776	9,916	46%	9,704	45%	2,156	10%
Other Ownership	47,926	33,323	70%	12,928	27%	1,675	3%
Total	**69,702**	**43,239**	**62%**	**22,632**	**32%**	**3,831**	**5%**

The watershed has nearly two-thirds of the area in high values. This is due largely to the amount of private lands,

especially residential areas. As residential lands increase in number and spread further to the boundaries of government ownership the amount of high value in the watershed will increase.

Table III-27: Areas of High Rating in Hazard, Risk and Values at Risk Jumpoff Joe Watershed

Ownership	Acres	High Concern Areas Acres/Percent	
BLM	21,776	1,660	8%
Other Ownership	47,926	17,452	36%
Total	**69,702**	**19,112**	**27%**

The Jumpoff Joe watershed as a whole has nearly all of the area rating as high in all three factors. The large amounts of lands with high values at risk and the high level of risk of wildfire occurrence demonstrates the urgent need for management actions and activities that will decrease the potential for large stand replacement wildfire occurrence.

3. Quartz Creek OHV Area

Wildfire Risk - The designation of this area for off-highway vehicle (OHV) recreation has the potential to increase the level of wildfire risk within the area. The current view is that risk will not be significantly changed. The reason is that the project area is currently informally being used for off-highway recreation. The OHV designation has formally recognized an existing human use in the project area. This could have the impact of increasing the amount of use. However, as a designated OHV area, BLM would regulate which areas are used, closing areas that have high hazard, initiate a fire prevention program for OHV use for the area, increase fire protection patrol as the fire danger increases, and close the areas when fire danger reaches critical levels.

The OHV area currently has a high level of wildfire risk. Part of that is a result of the current OHV use. Applying management to that use would reduce a portion of that risk, but an increase in the amount of use could negate that reduction in risk. Therefore, the level of risk was considered to remain at the current level.

J. Species and Habitats

1. Introduction

The responsibilities of the federal agencies include the active management of special status species and their habitats, S&M species and their habitat, special areas and native plants. The following are special status

protection categories used as guidelines for management of special status species and their habitats.

Listed and proposed listed species are those species that have been formally listed by the U.S. Fish and Wildlife Service (USFWS) as endangered or threatened or officially proposed for listing. The goal is to enhance or maintain critical habitats and increase populations of threatened and endangered plant species on federal lands. Restore species to historic ranges consistent with approved recovery plans and federal land use plans after consultation with federal and state agencies.

S&M species were identified as needing special management attention by the Northwest Forest Plan ROD in Table C-3 (USDA/USDI ROD, 1994). These species must be managed at known sites and located prior to ground-disturbing activities (survey strategy 1 & 2). Some species listed in the Northwest Forest Plan need to be inventoried extensively, and, if identified, some of these sites need to be managed (survey strategy 3). A regional survey would be conducted on survey strategy 4 species.

Candidate and Bureau-sensitive species are federal or state candidates and those species considered by the BLM to be of concern in becoming federal candidates. The goal is to manage their habitat to conserve and maintain populations of candidate and Bureau-sensitive plant species at a level that will avoid endangering species and the need to list any species as endangered or threatened by either the state or federal government.

State-listed species and their habitats are those plants listed under the Oregon Endangered Species Act. Conservation will be designed to assist the state in achieving their management objectives.

Bureau-assessment species are those species considered by the state BLM office as important species to monitor and manage, but not on as crucial a level as candidate or Bureau-sensitive species. The goal is to manage where possible so as not to elevate their status to any higher level of concern.

BLM tracking species are not currently special status species, but their locations are tracked during surveys to assess future potential needs for protection.

2. Botanical

Table III-28 lists special status plants found within the Jumpoff Joe watershed. Six populations of *Cypripedium fasciculatum,* one population of *Cypripedium montanum* and four populations of *Allotropa virgata* have been located along with numerous, expansive populations of *Camassia howellii*. One population of *Sedum moranii* and one population of *Chlorogalum angustifolium* were found on rocky outcrops. There are six occurrences of *Limnanthes gracilis var. gracilis.* All of these populations were found during recent timber sale surveys, the total acreage of which constitutes 27% of the watershed. This high population frequency found in such a small portion of the watershed suggests that high potential exists for rare plants throughout this watershed.

Table III-28: Special Status Plants - Jumpoff Joe Watershed

Species Name	Species Status	Habitat
Cypripedium fasciculatum	SM/SC/BS	Moist mixed evergreen with filtered sun
Allotropa virgata	SM	Mixed evergreen
Cypripedium montanum	SM	Moist to dry mixed evergreen
Camassia howellii	SC/BS	Dry serpentine openings
Limnanthes gracilis var. gracilis	SC/BS	Wetlands
Sedum moranii	SC/BS	Serpentine cliffs
Chlorogalum angustifolium	BA	Grasslands/Oak woodlands

SC = Species of Concern, SM = Survey and Manage species, BS = Bureau-Sensitive, BA = Bureau Assessment

Since little of the Jumpoff Joe watershed has been surveyed, current conditions must be based on a discussion of potential habitats of the species that have been found. There are late-successional conditions in the watershed which provide habitat for the following species: *Cypripedium fasciculatum*, (Clustered Ladyslipper) (CYFA), *Cypripedium montanum*, (Mountain Ladyslipper) (CYMO) and *Allotropa virgata* (Candystick) (ALVI). According to Appendix J of the Final Supplemental Environmental Impact Statement (FSEIS) Northwest Forest Plan, CYFA and CYMO are most likely found in areas with 60-100% shade provided by older stands of various plant communities within Douglas-fir forests. It further states that although these species are not attached to a specific vegetation community, they are, more importantly, dependent on specific microsite characteristics, including high percent shading, high moisture and undisturbed mychorrhizal connections in older age class forest. The plant series most likely to harbor these orchids within the Jumpoff Joe watershed are Douglas-fir/white fir series in a mature condition class. Currently, 78% of the BLM land in the watershed falls into this plant series but only 25% is in a mature condition class. The actual viable habitat for these species would be even smaller; limited to microsites with moister, north aspects, larger condition classes and 60-90% canopy closure. *Allotropa virgata* is also found in late-successional habitats where conditions are drier and is linked to dead and down components of the forest ecosystem as well as undisturbed mychorrhizal connections. Without intensive field surveys it is difficult to determine the actual amount of habitat that exists for these three species in the watershed because microsite characteristics cannot be determined from vegetation maps.

The Douglas-fir plant series is mostly in over dense stands due to lack of fire. The watershed is at high risk for catastrophic fire which would virtually eliminate the special status species dependent on late-successional conditions. Although the three species listed have been known to tolerate, and possibly even thrive from low-intensity fire, it has also been shown that such plants will not survive high-intensity fire.

Serpentine areas can be found in the Jumpoff Joe watershed. The primary plant series for these areas is Jeffrey pine which covers 8% of BLM land in the watershed. This is the habitat where the largest acreage of special status plant populations have been found in the watershed. *Camassia howellii* has been found in 24 different locations in the watershed. There has been a decrease in size of these serpentine areas due to encroaching trees and shrubs brought on by the exclusion of fire. Such encroachment increasingly limits the habitat for this special status species. Surveys are lacking for the Red Mountain area in this watershed. It is likely that more special status species could be found if this large serpentine area were surveyed.

Another special status plant habitat that has been extremely limited in extent by development is native grassland/schlerophyllous shrub/oak woodland savannah community types found in valley bottoms and adjacent low elevation slopes. These community types form a mosaic valley habitat interspersed with seasonally wet areas. The species, *Limnanthes gracilis var. gracilis*, is found in the wetter zones of this valley habitat. The special status species, *Plagiobothrys figuratus ssp. corallicarpus* and *Carex livida* are other species found in these habitats to the south in the Grants Pass watershed. (More details on this habitat can be found in the Wildlife Current Conditions section.)

Rock outcrops in the Jumpoff Joe watershed offer habitat for the special status species, *Sedum moranii* and *Chlorogalum angustifolium.*

Invasion of noxious weeds could eventually affect special status plants. Though a thorough inventory of noxious weeds has not been completed in the watershed, their occurrence has been documented. They are most common in the non-forested areas where pastures or grasslands have been invaded by such species as star thistle, scotchbroom or annual exotic grasses. These species are a threat because they compete with native vegetation, reducing plant diversity.

A major data gap is the lack of information regarding non-vascular plants in the watershed. A rough estimate from Table C3 (ROD), Survey and Manage Species, shows that 50 non-vascular species could be found in the vicinity of the Jumpoff Joe watershed. However, no surveys have been done for non-vascular plants.

3. Aquatic Environment

a. General

Large wood contributes to the riparian and stream, habitat, shade and nutrients for terrestrial and aquatic insects. Large woody material is important for creating habitat complexity for rearing juvenile anadromous fish and cover for adults during migration. Stream meander is important for dissipating stream velocity and increasing habitat for juvenile fish winter refuge, especially for coho salmon. Adult and juvenile fish production can also be limited from migration barriers such as road culverts. Yearling juvenile fish can move miles within one watershed, especially

during summer months when they seek cool waters. Excessive sedimentation especially delivered at wrong time intervals can delay adult migration and spawning and suffocate eggs in the redds. Sedimentation can cause secondary infections on over-wintering juvenile fish which are stressed from the lack of sufficient over-winter habitat to escape high water velocities.

Road construction next to streams can disconnect streams from the floodplain, impede stream meander and act as heat sinks which transfer a great deal of heat to the riparian area and with consequent increases of stream water temperature.

Cattle grazing exacerbated the slow regeneration of conifers or total decline in conifer reestablishment caused from soil compaction in the riparian areas. The result is lack of shade and an increase instream temperature. Large tree recruitment is extremely slow.

Timber harvesting and the presence of roads accelerate surface water runoff and erosion of sediment into the streams, resulting in decreased insect and fish production.

The cumulative effects of management activities have substantially altered the timing and quantity of erosion and changes instream channels, all which have impacted fish production at one time or another. Streams and riparian areas with federal ownership appear to be in much better condition than streams on non-federal lands. During low-flow periods, water flows from federal lands in some areas is totally withdrawn for irrigation, leaving the streambed dry.

b. Specific/Stream Channel and Riparian Area

Jumpoff Joe Creek is composed of a plateau in the upper stream reach, narrow canyons with steep side slopes in the middle elevations and a narrow alluvial valley with wider floodplains in the lower elevations. Most BLM streams are located in narrow floodplains or canyons and are inhabited by trout and steelhead, coho and chinook salmon. Trout and steelhead inhabit all stream reaches and coho and chinook inhabit the lower stream reaches with stream gradients of 3-4% or less. The tables in Appendix E depict a summary of past stream survey information.

The streams in Jumpoff Joe watershed have been channelized from agricultural and mining practices and road construction. Channelizing has prevented the streams from meandering and forming side channels. Meandering side channels provide more fish habitat or refugia than a single channel. Channelizing streams has disconnected the floodplain with the channel and has probably decreased fish rearing capability over the past century. Presently there is no connectivity between the stream and the floodplain where streams are channelized. Few if no side channels exist for rearing. Channelization causes water flows to accelerate which can decrease fish and insect production.

Historically, Jumpoff Joe Creek provided some of the best habitat for anadromous fish in the Rogue River basin. Habitat includes streambed substrate quality and quantity available for spawning, pools, large woody debris and log jams and good quality and quantity of water for fish rearing. The mainstem is dewatered at the mouth annually from irrigation and is considered having "areas of lost fish production." Fish production will never reach an optimum level while water quantity is limited.

All streams in the Jumpoff Joe watershed characteristically have the same primary factors limiting salmonid production: 1) in stream habitat complexity is lacking in large woody debris, greater than or equal to 24 inches in diameter and the length should be equal to or greater than the bankfull width; 2) stream shade less than 60%; 3) lack of mature trees, especially conifers, >32-inches in diameter within 100 feet from the stream; 4) better flows in the lowlands, and 5) the amounts of coarse wood will vary depending on the plant series. The Southwest Oregon Late-Successional Reserve Assessment (USDA and USDI, 1995) has listed the following (Table III-29) as the minimum levels for large woody material after stand replacement (fire with timber salvage) and non-stand replacement (commercial thinnings) events (per acre basis). These should be the minimum target levels for the Jumpoff Joe watershed. There is no known upper limit.

Table III-29: Coarse Wood by Plant Series

Plant Series	Stand Replacement Event	Non-Stand Replacement Event
Douglas-fir	15 pieces > 20 feet long and > 16 inches in diameter (small end); snags >24 inches in diameter (average): 3.4 to 4.2	≤ 20 pieces > 20 feet long and > 16 inches in diameter (small end); snags: retain all
Jeffrey Pine	10 pieces > 20 feet long and > 16 inches in diameter (small end); snags >12 inches in diameter (average): 3.4 to 4.2	≤ 20 pieces > 20 feet long and > 16 inches in diameter (small end); snags :retain all
Ponderosa Pine	10 pieces > 20 feet long and > 16 inches in diameter (small end); snags >24 inches in diameter (average): 3.4 to 4.2	≤ 20 pieces > 20 feet long and > 16 inches in diameter (small end); snags retain all
White Fir	12 pieces > 20 feet long and > 16 inches in diameter (small end); snags >30 inches in diameter (average): 3.4 to 4.2	≤ 20 pieces > 20 feet long and > 16 inches in diameter (small end); snags :retain all
White Oak	Unknown	Unknown

Jumpoff Joe Creek is almost the same today as it was depicted in the 1970's stream inventories. The exception is the lack of large wood in the riparian and stream and the lack of old-growth conifers and hardwoods. The creek can be characterized by three major stream reaches. The lower reach is a low gradient stream in agricultural and lowland forest. The middle reach is a moderate gradient of 3-6% and includes a gorge. The upper reach is above the gorge and consists of a large plateau.

The lower reach of Jumpoff Joe Creek consists of good salmonid habitat except during intermittent flow periods. A waterfall is impassable to coho under low-flow periods. There is a lack of large wood in the stream and riparian areas. The riparian consists of 30% shade and the wide stream is exposed largely to the sunlight. Stream temperatures are in the 70's F. Redside shiners, suckers and dace exist in this reach and are competitors with salmonids for space and food. Numerous juvenile cutthroat trout can be found in isolated pools during the low-flow period. Mature alder are dominant in the riparian landscape. Mature pine were harvested and young conifers are succeeding. Spawning substrate is limited, yet production of salmonids is low to moderate, with a large amount of cobble and bedrock. Fall chinook spawn in the first four miles and rear in the mainstem of the Rogue River. Only 2.3 miles of the mainstem of Jumpoff Joe Creek is on public lands. Tributaries cross considerably more public lands. Low flows and lethal temperatures limit rearing potential up to mile 14.5. Extensive gravel removal operations have removed salmonid spawning habitat.

The middle reach consists of a steep gorge and limits passage of anadromous fish. The stream cascades with numerous major impassable falls and cataracts. Large boulders and bedrock are the dominant substrate which prohibit any salmonid production. The gorge is well shaded with steep side slopes and abundant conifers. Cutthroat trout are more common in this reach.

The upper reach is a plateau with a low gradient less than 3% and numerous beaver dams which are decades old. The substrate is bedrock and silt with limited cutthroat trout spawning habitat. This reach has fewer tributaries resulting in an intermittent flow in late summer. Cutthroat trout and sculpins are the only fish in this stream reach. There is little shade from the mixed hardwood and conifer forest. The floodplain is the width of the valley bottom and the stream is wide with a lot of sun exposure. Clearcuts were prevalent in the past. The forest and riparian are predominately 20-50 year old Douglas-fir trees with some mature hardwoods, predominantly alder. Numerous large and deep pools with a lot of logging slash, woody debris were in the stream prior to the 1980's. There were abundant log jams. Water quality is very good.

Quartz Creek is the most productive stream in Jumpoff Joe Creek for coho salmon. Quartz Creek is considered a core coho salmon area in the Rogue River basin. Streambank stability and canopy shade are diminishing in the watershed. Decomposed granite is prevalent in the watershed. Winter coho rearing habitat is limited. Major limiting factors include lack of large wood in the stream and riparian areas; lack of riparian diversity of trees; high summer water temperatures; poor winter habitat; and marginally limiting from upland sedimentation.

Quartz Creek is a lowland agricultural stream which quickly becomes a steeper stream in mountainous forested lands. The core coho area is in the low gradient 3% or less, low width to depth ratio with a gravel substrate. Stream sinuosity is restricted from land development and several stream reaches have been rechannelized over past years.

Louse Creek is the largest and one of the most valuable tributaries for anadromous fish. There is a large amount

of spawning gravel. Stream temperatures can reach lethal levels as high as 80EF at the mouth in August. Flows are low to intermittent in the first five miles in late summer months. There were eleven irrigation diversions in the 1970's. A sparse hardwood riparian exists in the first four miles with bedrock/boulder as the predominant substrate. Above mile five, there is good salmonid rearing and spawning habitat. Pools for rearing habitat are limiting. Large instream wood is limiting combined with a sparse riparian overstory. Few mature conifers remain and the riparian consists of young 20-50 year old conifers and hardwoods. Overall, Louse Creek fish production is fair because of the limited adequate salmonid spawning substrate. Spawning gravels were more than likely removed during past mining practices. North Fork Louse Creek had old-growth conifers and alders in the first mile in the 1970's. The upper stream reaches were shrubs and clearcuts. Cool water existed only in the uncut stands of timber. Soil erosion is high with decomposed granite smothering the spawning grounds for salmonids. The cutthroat trout population is good condition.

Jack Creek stream surveys from the 1970's indicate Jack Creek has an intermittent flow in late summer. Cutthroat trout are present and there are good pools for rearing. The watershed was logged heavily. Boulder substrate exists from the mouth to mile 1.0 with little shade from hardwoods and conifers. The stream becomes intermittent in July with pools for cutthroat trout. In the past, old-growth conifers provided shade for cool water. Salmonid spawning gravels are low with the substrate mostly bedrock and cobbles. BLM ownership is on 1.2 miles. Cutthroat trout are found throughout the stream. Numerous log jams were present from past timber harvest, but are currently limited in number.

Soldier Creek and tributaries have marginal salmonid spawning gravel. The stream becomes dry in July and has an oak, conifer, cheatgrass riparian area. Cutthroat trout can be found in small isolated pools.

Morris Creek has a low amount of spawning gravel and is used by cutthroat trout, steelhead and coho salmon. The summer flows are nonexistent yet pools help sustain juvenile salmonids. Stream temperatures in the summer are in the 60's F. which is acceptable for salmonid survival. Coho and steelhead only use the first one-quarter mile of Morris Creek.

Cove Branch Creek is dry in the summer months. Isolated pools sustain cutthroat trout. Irrigation waters cause the stream to go dry. Cattle degraded the water quality in the past and it is unknown what cattle grazing exists in the 1990's. The watershed was logged heavily. The headwaters on BLM lands were all old growth but were logged. One-half of the stream is shaded by hardwoods. The stream has a low amount of spawning gravel for cutthroat trout. Good cutthroat habitat exists near the headwaters, probably due to spring waters. The upper reach of the stream consists of a boulder and bedrock canyon with numerous large falls and cataracts. Fish rearing pools are over seven-feet deep. There were numerous large wood debris jams in the past, but few exist today.

Waterbranch Creek is a steep stream (primarily boulder substrate) with no spawning gravel for salmonids. It is

intermittent in the late summer. It was logged extensively. It has a fair amount of shade and the riparian is mixed with hardwoods and conifers. It is characterized with rapid stream flow runoff and high erosion during high flows. Fish use is low and would be used by sculpins and cutthroat trout.

Fall Creek is deeply entrenched and steep with numerous waterfalls. It is a small stream and is not used by fish. The spawning gravels are nonexistent yet it has good water quality. There have been clearcuts in the whole watershed. The headwaters used to originate from old growth on BLM. The substrate is predominantly boulders and bedrock. Large wood debris jams were numerous after extensive logging and are moderate presently. The riparian shade is 75% or greater in most of the stream.

Orofino Gulch has limited salmonid spawning habitat with isolated pools in the summer when it becomes intermittent. It has good water quality and supports cutthroat trout. The water remains cool even during very low flows.

Horse Creek is a short flat and rapidly steep gradient stream. It has low potential for fish and only 45% adequate shade in the riparian. It is marginal for fish use yet is used by few cutthroat trout. The watershed was extensively logged and the result is a highly-degraded stream with sediment throughout and large boulders.

Ewe Creek in an average water year contributes one cubic foot per second of flow during August and September. There was a two-foot concrete dam on the mainstem in 1974 at mile 0.44. The salmonid spawning substrate is nonexistent and the stream is covered with decomposed granite over the spawning gravels. The riparian area was logged and is now shrubs, few conifers and hardwoods with mixed age classes.

Bummer Creek is an important spawning and rearing tributary for salmonids. It has an excellent amount of spawning gravel. Thousands of coho and steelhead juveniles have been observed and it has a good trout population. The riparian is well shaded with conifers and is a major contributor of cool water and good flows to Jumpoff Joe Creek.

Shorthorn Creek is a small tributary and is dry in the summer months. Cutthroat trout rear in isolated pools. The streambed is deeply entrenched and the stream has a steep gradient.

Harris Creek is a major tributary to Louse Creek and flows through an alluvial agricultural floodplain. It has a low amount of salmonid spawning gravel and a large amount of bedrock and decomposed granite covering spawning gravels. It becomes intermittent in the summer months with isolated pools for anadromous and resident fish. It has had heavy cattle use in the past. The riparian has moderate shade and is lacking in older conifers.

Schoolhouse Creek flows through agricultural lands and is an intermittent stream with limited use by cutthroat trout. The substrate consists of excessive amounts of decomposed granite. The riparian is mostly hardwoods.

Isolated pools in the summer support a small number of steelhead.

c. Macroinvertebrates

The only available macroinvertebrate information is for Jack Creek.

The low richness and abundance of Jack Creek's cold water biota and intolerant taxa indicate a lack of cool water and habitat complexity. Those factors are essential for salmonid production. Moderate shading from riparian vegetation allows summer water temperatures to exceed the lethal limit for most cold water biota. Low detrital habitat diversity and inputs are moderate to high. As a result, winter scouring harms macroinvertebrate production.

Table III-30: Jack Creek Benthic Macroinvertebrate Bioassessment Rating (Wisseman 1993)

Erosional Habitat	Margin Habitat	Detritus Habitat
Low abundance, richness	Absent	Low abundance, richness

d. Fish Distribution and Abundance

Jumpoff Joe Creek has the following miles of habitat for each species: coho salmon, 12; chinook salmon, 4.2; steelhead, 16; and cutthroat trout, 30.25 (Maps 10a-11b). Non-game species such as speckled dace, Pacific lamprey, sculpin, and redside shiner also inhabit the streams.

4. Wildlife

The Jumpoff Joe watershed contains a diverse array of wildlife. As many as 11 species of bats, 12 species of amphibians, 18 species of reptiles, hundreds of species of birds, and many thousands of species of insects may occur here. All but three indigenous mammals (grizzly bear, wolf and wolverine) are thought to have the potential to occur in the watershed.

The BLM is the only federal agency responsible for managing public lands within the watershed. Part of the Bureau's responsibility is the management of fish and wildlife habitat as well as sensitive species. This is primarily accomplished by maintaining native habitats and restoring degraded habitats. There are several habitats of concern in the watershed and numerous unique features.

a. Habitats

Wildlife habitats of southwestern Oregon are extremely complex. Terrain, climatic factors and vegetation combine

to create the wealth of habitats found from the valley floor to the peaks of the Siskiyou Mountains. The land found above the valley floor of the Jumpoff Joe watershed is dominated by coniferous forests. The age and the structure of these forests range from saplings to old growth. Hardwoods are a significant component of these forests contributing to structural and vegetative diversity. Within these forests are found an array of habitats including meadows, riparian areas, chaparral, cedar swamps, alder thickets, oak stands, Jeffrey pine savannah and a variety of other unique areas. The valley floor of the Jumpoff Joe watershed is dominated by a mix of grasslands mingled with conifers and hardwood trees. Habitats found here include oak savannahs, Jeffrey pine savannahs, meadows, pine forest, chaparral and riparian.

Different plant communities support the array of native wildlife. Animals require food, water, shelter and space to breed and raise young during their lifetime. Some species have adapted to a particular habitat (specialist) while others utilize a broad range of different plant communities to fulfill their needs (generalists).

Habitats that are an issue in the Jumpoff Joe watershed include late-successional forest, meadows, pine stands, oak groves, Jeffrey pine savannahs, oak savannahs and riparian habitat. All of these habitats have been impacted by human activity in the watershed.

(1) Valley Habitats

The Jumpoff Joe watershed is composed of three principal drainages (Louse, Bummer and Jumpoff Joe) flowing toward the mainstem of the Rogue River. These drainages are typified by an area of valley habitat and steep timbered hillsides. Due to the limited amount of agriculture that has taken place in the watershed, native valley habitats are in better condition in comparison to other watersheds in the immediate area. Current threats to valley habitat types include fire suppression, agriculture and urban development. In recent years, the Colonial Heights area in the Louse Creek drainage has seen a dramatic increase in the development of houses east of Interstate 5. This development has fragmented the native oak savannah habitat, and impacted the effectiveness of this habitat for wildlife. The valley habitat located along Jumpoff Joe and Bummer Creek drainages are in better condition than Louse Creek, but are also rapidly being developed.

Most of the valley floor and associated native habitat are under private ownership. Rural residential home sites are distributed throughout the valley. The landscape is largely broken up by houses, roads, fences and non-native vegetation. Of particular concern is the remaining oak savannah and Ponderosa pine/Jeffrey pine savannah habitat. These habitats have been identified as two of the five critical habitats by the Oregon/Washington neotropical bird working group. It is assumed further development of these habitats will have a negative impact on neotropical migrant birds.

Federally-administered tracts of land on the valley floor are scarce. The largest tract of this habitat type is located in T35S,R6W, Section 27, adjacent to the Merlin Landfill. This area is dominated by Oregon white oak,

Ponderosa pine and manzanita. Another large track of federally-administered valley bottom is the Sprague Seed Orchard located in T35S,R6W, Section 9. This tract of land is primarily agricultural with little native habitat. The remaining federally-administered land on the valley floor occurs in 40-80 acre widely scattered parcels.

Native valley habitats have shown some of the greatest decline of plant communities in southwestern Oregon. Though this watershed has endured better than adjacent watershed in regards to this habitat, it is nevertheless far from being out of risk. Due to the changing nature of private land management the remaining tracts of public land are critical in ensuring that this habitat and the biodiversity it supports continues to be represented in the valley. These stands provide primary nesting habitat for acorn woodpeckers *(Melanerpes formicivorous)* and western bluebirds *(Sialia mexicana)* as well as winter range for blacktail deer *(Odocoileus hemionus)*. Smaller mammals using this habitat include raccoon *(Procyon lotor)* and grey fox *(Urocyon cinereoargenteus)*.

(2) Upland Habitats

Most of the federally-administered lands are found in the uplands. Here, forests dominate the landscape, with numerous species of conifers, hardwoods, shrubs and herbaceous plants. Many of the hardwoods are berry and mast producers that provide a rich food source for wildlife. Mast crop producers include California black oak *(Quercus kelloggii)*, Oregon white oak *(Quercus garryana)*, tanoak (Lithocarpus densiflorus) and California hazel *(Corylus cornuta)*. Berry producing plants such as Pacific madrone *(Arbutus menziesii)*, California coffeeberry *(Rhamnus californica)* and manzanita *(Arctostaphylos spp.)* are also important crop producers for wildlife. Habitats within the uplands include meadows, riparian areas, chaparral, pine savannahs and oak stands that all add diversity to the forest. Natural disturbances are important in generating and maintaining a number of plant communities and habitats. Human caused disturbances such as logging, mining and road building have all affected the condition of the upland forest. Current condition of the forest determines wildlife species abundance and diversity. The shift from older, structurally diverse forests to younger, structurally simplified forests has benefitted generalists species, and has not been advantageous to species that depend on late-successional habitat. The most extensive disturbance activity in the watershed has been logging. Currently most private lands and county lands are in early seral stage to pole stage, with little mature forest. Condition of federally-administered land varies from recent clearcuts to old growth. Most federally-managed stands are in the 5-20 inch diameter range. Many of these stands are the result of past timber harvest and are structurally simplistic in comparison to natural stands. Remaining stands of late-successional habitat are extremely important due to their dramatic decline from historic levels and fragmented nature. Currently 19.5% of the watershed remains in late-successional habitat condition. Most of the late-successional habitat is located in the Louse Creek drainage.

The high density of roads is of particular concern because roads have many negative impacts on wildlife. Roads lead to increases in vehicular/human disturbance, provide access for poaching and further fragment areas of late-successional habitat. The watershed has seen a large increase in the road densities on federal land since World War II. However, there are some sections remaining in the watershed with low road densities. These remaining

sections offer important refugia from human disturbance for species such as black bear.

(3) Riparian Habitat

Riparian areas are one of the most heavily used habitats found in the watershed, both by humans and by wildlife. Many life cycle requirements of animals are met in these areas. Aquatic and amphibious species are intrinsically tied to these habitats, as are all the species that feed on these animals. The Jumpoff Joe watershed is composed of several fish bearing streams including Horse, Joe, Jack, Quartz, Bummer, Cove, Fall, Louse and many unnamed creeks and gulches. Riparian habitats have been heavily impacted by mining, road building, urbanization, logging, and agriculture.

The riparian zone on private lands varies from mature stands of conifers to bare streambanks. Most of the private riparian is dominated by hardwoods and young conifers. The riparian zone on federally-managed lands are generally in better condition than private but still have been negatively impacted by past management practices.

A number of the principal drainages have BLM roads built adjacent to and often in the riparian zone. These roads affect the quality of the riparian habitat by functioning as "heat sources," and altering the natural sinuosity of the stream. The amount of water allowed to flow from the source to the Rogue River determines the usefulness of streams to aquatic species. During low-flow periods water withdraws can determine the absence/presence of many aquatic species. Currently many native aquatic and amphibious species are no longer as prevalent as they were during pre-settlement time. Beaver *(Castor canadensis)*, river otter *(Lutra canadensis)* and muskrat *(Ondatra zibethica)* were common in the streams on the valley floor prior to settlement. Currently these species have a restricted range in the watershed. Beavers are still present in Jack and Jumpoff Joe Creek, with their greatest concentrations occurring in the upper four-mile reaches of Jumpoff Joe Creek. This stretch of water is unique and unlike any other stream in the resource area. The stream is perched on a low gradient plateau, and is dominated by a series of beaver dams. Relict ponds created by beaver have formed into meadows in which the creek meanders through a series of oxbows and undercut banks. This, in turn, has created superb resident fish habitat as well as a dynamic riparian zone for other species. Though this area has been heavily mined and logged, it is currently stabilizing and recovering from these past activities. The remainder of the riparian habitat in the watershed has been degraded from historic conditions and currently is less capable of supporting the historic species diversity.

(4) Specialized Habitats

Special and unique habitats are those habitats that are either naturally scarce (caves, springs, mineral licks, etc.), rare because of human influence on the environment (low elevation old growth, oak/grasslands, etc.) or because of natural cycles (snags, meadow production, etc.). Often these habitats receive a greater level of use by wildlife

than surrounding habitats, or are essential for certain aspects of a particular animal's life history (e.g., hibernation).

The Jumpoff Joe watershed contains a number of unique habitats. The continued maintenance of these habitats will determine presence of many sensitive species. Sensitive habitats of issue are discussed in the following paragraphs.

Old-growth forest habitat is forest composed of a multi-canopy structure, dominated by large trees, snags and large down logs. Due to the wide variety of niches, these forests have a greater diversity of wildlife species than do younger forested stands. Currently, this habitat type is restricted to relict, fragmented stands scattered through the watershed. Many of these stands are too small in size to meet the needs of some late-successional species. Due to the limited amount of this habitat found in the watershed, all remaining stands are important contributors to maintaining biodiversity.

Late-successional forests are those forests that are a minimum of 80 years of age, multi-canopied, with snags and large down logs. Ideally these stands would be distributed across the landscape, and would be the largest remaining patches to provide "interior" forest conditions. Narrow strips of late-successional habitat and riparian reserves generally do not contribute interior forest habitat due to the "edge effect" which increased by irregular shapes and small sizes. The edge to interior ratio effects how useful the stand is for late-successional forest species. Maintaining late-successional stands in drainages such as Quartz, Jumpoff Joe and Jack Creeks, where few stands remain, will aid in supporting late-successional biodiversity. Furthermore, adjacent stands that can be treated to accelerate late-successional conditions should be targeted to increase the size and functioning capabilities of the remaining late-successional stands. The drainage of Louse Creek contains the majority of the remaining late-successional habitat in the watershed. This drainage is deferred from scheduled timber harvest until the year 2003 due to cumulative effects from past management activities. Maps 15a and 15b display late-successional stands where silvicultural treatments could be used to accelerate late-successional conditions thereby enhancing the landscape linkage value and function of the remaining stands. Currently there is no old-growth forest in the watershed outside federally-managed stands.

Meadows under federal ownership are more common in the Jumpoff Joe watershed in comparison to adjacent watersheds. Shallow soils, perched water tables and old homesteads are the most common source of these meadows. Earlier in the century, many natural meadows were converted to agricultural land by homesteaders. Currently, the most significant threat to this habitat is tree encroachment due to the disruption of the natural fire cycle. Meadows are the primary habitat for a number of species such as California vole (*Microtus californicus*) and the western pocket gopher (*Thomomys mazama*) and are the primary feeding location for species such as the great grey owl (*Strix nebulosa*) and the American black bear (*Ursus americanus*). Table E-6 in Appendix E displays known meadows in the watershed and suggested treatment to maintain these meadows.

Big game winter range in the Jumpoff Joe watershed is in relatively good shape in comparison to adjacent

watersheds. Winter range is defined as land found below 2,000 feet in elevation, but may extend higher in elevation on southern exposed slopes. Ideally, these areas are a mixture of thermal cover, hiding cover and forage. Historically, the valley floor and adjacent slopes served as winter range for deer and elk. Increased urbanization of the valley floor is the single greatest threat to this habitat type in the watershed. Other threats include agriculture and the suppression of the natural fire cycle. The winter range is in poor condition due to fire suppression and the introduction of exotic plant species. Areas of exceptional quality winter range are found in the Horse Creek drainage in T34S,R5W, Sections 19 and 20.

Dispersal corridors aid in gene pool flow, natural reintroduction and successful pioneering of species into previously unoccupied habitat. Generally these corridors are located in saddles, low divides, ridges and along riparian reserves. Without such corridors many isolated wildlife habitats would be too small to support the maximum diversity of species. Numerous ridgelines within the watershed allow for localized dispersal. Ridges connecting Fielder Mountain to Sexton Summit, via Old Baldy, Elk Mountain and Robert's Mountain are heavily used by elk, bear, deer, mountain lions and other species as travel corridors. Dispersal between drainages is also accomplished through low divides. The mature forested divide east of Robert's Mountain in T34S,R5W, Section, 27 (SE¼SE¼) allows for dispersal of late-successional species between Jumpoff Joe Creek and Jack Creek. The Jack Creek spotted owl managed core provides contiguous older-forest habitat from Jumpoff Joe Creek drainage, across Jack Creek into the Graves Creek drainage. Other remaining blocks of older forest that contiguously run from the valley floor to the higher mountain ridges allow for "the elevator effect" which permits for seasonal dispersal for late-successional species. This is particularly important in the Jack and Jumpoff Joe Creek drainages where little contiguous older forest remains. The upper Quartz Creek drainage (T34S,R7W, Sections 23 and 25) provides near continuous older forest from near the valley floor over the high ridges into Grave Creek. Riparian reserves were designed in the Northwest Forest Plan to function as dispersal corridors. Due to the past management activities and the checkerboard ownership pattern in this watershed, it is unlikely that many of these reserves currently function as corridors for late-successional forest species.

Ponds located on federally-managed lands are uncommon in the watershed. Three sites are known: one in T34S, R5W, Section 19, and two constructed ponds in T34S,R5W, Section 23. Elk wallows located in T34S,R7W, Section 28 (SE¼) generally provide water until late summer.

Oak woodlands/savannahs are a rich resource providing nesting habitat, mast crop production, big game wintering range and sheltered fawning areas. Historically, oak/pine grasslands dominated the valley floor. Increased agricultural use, urbanization, introduction of exotic plants and changing of natural drainage patterns have all adversely impacted native oak/grasslands. In addition, fire has been excluded for nearly 80 years, which has allowed pine, fir and cedar to become firmly established in the understory of oak woodlands. Stands of oak/grasslands administered by the federal government are scattered throughout the watershed, with the majority of these stands being in poor condition due to fire suppression.

Mine adits play a critical role in the life history of many animals, providing shelter from environmental extremes, seclusion and darkness. Mines are the primary habitat for species such as the Townsend's big-eared bat *(Corynorhinus townsendii)*, a ROD buffer species and Bureau-sensitive species. Other species such as the bushy-tailed woodrat *(Neotoma cinerea)* and the cave cricket *(Ceuthophilus spp.)* use caves as their primary residence. These sites are also used seasonally for a number of species such as swarm sites (breeding sites) for bats and den sites for porcupine *(Erethizon dorsatum)*. A number of mine adits are located on federally-administered land. One of the largest hibernaculum in southwestern Oregon for Townsend's big-eared bats is located in the Ida Mine. The entrance to this adit collapsed during the winter of 1994. The bats were entering from a shaft located above the adit, and it is unknown if this site is still being used. Recreational use of mines limit their value for wildlife as they displace easily disturbed species.

Deer fawning/elk calving areas are critical for successful maintenance of deer and elk populations. Key components include quality forage, water, cover, and gentle warm slopes. Fawning areas on federally-administered lands are found in many small meadows scattered throughout the watershed, and in areas with southern exposures. Fawning areas on private land are found throughout the watershed but vary in quality due to disturbance.

5. Special Status Species

There are 54 potential sensitive species in the watershed (19 birds, 13 mammals, 7 amphibians, 5 reptiles, 8 insects and 1 mollusk). The habitat requirements for these animals vary from species to species.

The northern spotted owl is the only species listed under the Endangered Species Act (ESA) known to occur within the watershed. There are three other listed species that could occur within the watershed, including the peregrine falcon, the bald eagle and the marbled murrelet. In addition to the listed species there are candidate species, Bureau-sensitive species, ROD buffer species, as well as S&M species (see Northwest Forest Plan ROD, p. C-49).

Table III-31 lists the known and potential special status species found in the watershed, along with legal status, and level of survey to date. This list includes species listed under the ESA, proposed for listing, and candidate species being reviewed by the USFWS. State listed species as well as Bureau-assessment species are also listed. (For more information on this list and habitat needs, see Appendix E.)

Table III-31: Jumpoff Joe Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
Grey Wolf	*Canis lupus*	Absent	FE,SE	None to date

Table III-31: Jumpoff Joe Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
White-footed Vole	*Aborimus albipes*	Unknown	BS,SP	None to date
Red Tree Vole	*Aborimus longicaudus*	Present	SM	Limited surveys
California Red Tree Vole	*Aborimus pomo*	Unknown	BS	None to date
Fisher	*Martes pennanti*	Unknown	BS,SC	None to date
California Wolverine	*Gulo gulo luteus*	Unknown	BS,ST	None to date
American Marten	*Martes americana*	Unknown	SC	None to date
Ringtail	*Bassacriscus astutus*	Suspected	SU	None to date
Peregrine Falcon	*Falco peregrinus*	Unknown	FE,ST	None to date
Bald Eagle	*Haliaeetus leucocephalus*	Suspected	FT,ST	None to date
Northern Spotted Owl	*Strix occidentlis*	Present	FT,ST	Limited surveys
Northern Goshawk	*Accipiter gentilis*	Unknown	BS,SC	Some surveys
Mountain Quail	*Oreortyx pictus*	Present	BS	None to date
Pileated Woodpecker	*Dryocopus pileatus*	Present	SC	None to date
Lewis' Woodpecker	*Melanerpes lewis*	Unknown	SC	None to date
White-headed Woodpecker	*Picoides albolarvatus*	Unknown	SC	None to date
Flammulated Owl	*Otus flammeolus*	Unknown	SC	None to date
Purple Martin	*Progne subis*	Unknown	SC	None to date
Great Grey Owl	*Strix nebulosa*	Unknown	SV,SM	Limited surveys
Western Bluebird	*Sialia mexicana*	Suspected	SV	None to date
Acorn Woodpecker	*Melanerpes formicivorus*	Suspected	SU	None to date
Tricolored Blackbird	*Agelaius tricolor*	Unknown	BS,SP	None to date
Black-backed Woodpecker	*Picoides arcticus*	Unknown	SC	None to date
Northern Pygmy Owl	*Glaucidium gnoma*	Present	SU	Limited surveys
Grasshopper Sparrow	*Ammodramus savannarum*	Unknown	SP	None to date
Bank Swallow	*Riparia riparia*	Migratory	SU	None to date
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Present	BS,SC	Limited surveys

Table III-31: Jumpoff Joe Watershed Special Status Species Vertebrates

Common Name	Scientific Name	Presence	Status	Survey Level as of 5/97
Fringed Myotis	*Myotis thysanodes*	Suspected	BS,SV	None to date
Yuma Myotis	*Myotis yumanensis*	Suspected	BS	None to date
Long-eared Myotis	*Myotis evotis*	Suspected	BS	None to date
Hairy-winged Myotis	*Myotis volans*	Suspected	BS	None to date
Pacific Pallid Bat	*Antrozous pallidus*	Unknown	SC	Limited surveys
Western Pond Turtle	*Clemmys marmorata*	Present	BS,SC	Incidental sightings
Del Norte Salamander	*Plethodon elongatus*	Present	BS,SV,SM	Limited surveys
Foothills Yellow-legged Frog	*Rana boylii*	Suspected	BS,SU	Limited surveys
Red-legged Frog	*Rana aurora*	Unknown	BS,SU	None to date
Clouded Salamander	*Aneides ferreus*	Suspected	SC	Limited surveys
Southern Torrent Salamander (Variegated Salamander)	*Rhyacotriton variegatus*	Present	BS,SV	Limited surveys
Black Salamander	*Aneides flavipunctatus*	Suspected	SP	Limited surveys
Sharptail Snake	*Contia tenuis*	Suspected	SC	None to date
California Mtn Kingsnake	*Lampropeltis zonata*	Present	SP	Incidental sightings
Common Kingsnake	*Lampropeltis getulus*	Present	SP	Incidental sightings
Northern Sagebrush Lizard	*Sceloporus graciosus*	Suspected	BS	None to date
Tailed Frog	*Ascaphus truei*	Suspected	SV	None to date

STATUS ABBREVIATIONS:

FE--Federal Endangered
FT--Federal Threatened
FP--Federal Proposed
FC--Federal Candidate
SE--State Endangered
ST--State Threatened
SC-- ODFW Critical
SV--ODFW Vulnerable
SP--ODFW Peripheral or Naturally Rare
SU--ODFW Undetermined
BS--Bureau-Sensitive
SM--Survey and Manage

Table III-32: Jumpoff Joe Watershed Special Status Species (Invertebrates)

Common Name	Presence	Status	Survey Level as of 5/97
Burnell's False Water Penny Beetle	Unknown	BS	None to date
Denning's Agapetus Caddisfly	Unknown	BS	None to date
Green Springs Mtn. Farulan Caddisfly	Unknown	BS	None to date
Schuh's Homoplectran Caddisfly	Unknown	BS	None to date
O'brien Rhyacophilan Caddisfly	Unknown	BS	None to date
Siskiyou Caddisfly	Unknown	BS	None to date
Alsea Ochrotichian Micro Caddisfly	Unknown	BS	None to date
Franklin's Bumblebee	Unknown	BS	None to date
Oregon Pearly Mussel	Unknown	BS	None to date

BS -- Bureau-Sensitive

6. Survey and Manage Species

Table III-33 presents the species that are to be protected through survey and management guidelines as outlined in the NFP-ROD. This table also describes the level of protection and the amount of surveys conducted to date. It is suspected that the current late-successional reserve network will not meet the needs of these species, such that further restrictions within matrix lands are necessary to ensure long-term viability of their populations. Surveys for new sites must be conducted for red tree vole, Del Norte salamander and the five species of bats.

Additional S&M species identified by the NFP-ROD (p. C-49) includes 234 species of fungi, 81 species of lichens, 41 mollusks and 23 species of bryophytes. Very little data is available on these species including their description, range or life requirements. As a result of the lack of information it is unknown if these species occur in the watershed.

Table III-33: Survey and Manage Species & Buffer Species in the Jumpoff Joe Watershed

Species	Presence	Protection Level
Del Norte salamander *@ (*Plethodon elongatus*)	Present	Manage known sites and survey prior to activities, within matrix land buffer length of one potential site tree or 100 feet, which ever is greater.

Table III-33: Survey and Manage Species & Buffer Species in the Jumpoff Joe Watershed

Species	Presence	Protection Level
White-headed woodpecker* (*Picoides albolarvatus*)	Unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Black-backed Woodpecker* (*Picoides pubescens*)	Unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Flammulated owl* (*Otus flammeolus*)	Unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential
Great grey owl @ (*Strix nebulosa*)	Unknown	1/4 mile protection zone around nest sites, survey prior to activities, 300 foot buffers of meadow and natural openings.
Red tree vole @ (*Aborimus pomo*)	Present	Manage known sites and survey prior to activities

*Buffer species @ Survey and Manage Species

7. Threatened or Endangered Species

The Northern Spotted Owl (threatened) is the only known species listed under the ESA known to nest in the watershed. Currently there are nine known centers of activity, eight which have 100 acre cores, and another four sites outside the watershed whose provincial home range (1.3 miles radii) may be affected by activities occurring inside the watershed (see Appendix E for the list of sites and results of nesting surveys). An active site is one in which a territorial single or pair has occupied the site at least once since 1985. Surveys for northern spotted owls have been conducted since the mid-1970's within the watershed. Early surveys were opportunistic until 1985 when areas were surveyed prior to a proposed management activity.

The USFWS uses thresholds for suitable habitat around spotted owl sites as an indication of the site's viability and productivity. Thresholds have been defined as 50% of the area within 0.7 mile of the center of activity, or approximately 500 acres; and 40% of the area within 1.3 miles or approximately 1,388 acres.

Tables E-1 and E-2 in Appendix E describes the condition of the sites within the watershed or adjacent to the watershed. No sites within the watershed exceed the 1,388 acres necessary for long-term viability.

Spotted owl habitat managed by the BLM has been analyzed using the McKelvey rating system. The McKelvey rating system is based on a model that predicts spotted owl population based on habitat availability (see Appendix E for more information on this system). Stands were examined for criteria such as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken into consideration. During the spring of 1996 stands were visually rated and placed into the six

categories. Maps 16a and 16b display the results of this study. Table III-34 summarizes the amount of habitat available for spotted owls in the watershed on lands administered by the BLM and non-federal lands (State of Oregon, Josephine County and private). There are 1,029 acres of spotted owl nesting, roosting and foraging habitat (McKelvey rating #1) found on BLM-administered land in the watershed (1.4% of watershed). The largest contiguous blocks are located in Louse Creek drainage. Remaining optimal habitat in the watershed is heavily fragmented, particularly in the Jack, Quartz and Jumpoff Joe drainages.

The Jumpoff Joe watershed has 3,926 acres (5.6% of watershed) of spotted owl roosting and foraging habitat (McKelvey rating #2). The largest patches are found in the Quartz Creek drainages.

Dispersal habitat for spotted owls is defined as stands that have a canopy closure of 40% or greater, and open enough for flight and predator avoidances. This habitat is scattered throughout the watershed, with large concentrations in the Tunnel, Jack and Louse Creek drainages.

8. Private and County Land

In 1996, an effort was made by the BLM to classify the forest type using the McKelvey model on private and county lands in the watershed. This information was largely gathered through photo interpretation, ground truthing and roadside reconnaissance. This endeavor gives a fairly accurate depiction of the status of private, state and county lands. Table III-34 displays the amount of available habitat for northern spotted owls on private, state and county land in the watershed. Non-federally administered land is devoid of any late-successional forest habitat. Most of the private land is composed of stands that do not meet any needs for late-successional forest species, but has the potential to become optimal habitat (26,022 acres). It is unlikely that landowners will choose to forego commercial harvest to allow these stands to become suitable habitat. Currently there are 2,134 acres of private land functioning as dispersal habitat for the northern spotted owl. Most of the remaining private land is agricultural and will never become suitable habitat.

The McKelvey rating system is as follows:

Class 1 - Spotted owl nesting, roosting, and foraging habitat
Class 2 - Spotted owl roosting and foraging
Class 3 - Currently does not meet 1 or 2 criteria
Class 4 - Will never meet 1 or 2 criteria
Class 5 - Currently does not meet 1 or 2, but meets dispersal
Class 6 - Will never meet 1 or 2 but meets dispersal

Table III-34: McKelvey Rating Classes

Class	BLM Lands		Non-Federal Lands		BLM and Non-Federal Lands	
	Acres	%	Acres	%	Acres	%
1	1,029	4.7%	0	0%	1,029	1.4%
2	3,226	14.8%	700	1.4%	3,926	5.6%
3	10,137	46.6%	26,022	54.2%	36,159	51.8%
4	2,934	13.4%	19,070	39,7%	22,004	31.5%
5	4,291	19.7%	1,670	3.4%	5,961	8.5%
6	159	0.7%	464	0.9%	623	0.8%

Marbled Murrelet (Threatened) critical habitat was designated by the USFWS in May of 1996. There is no designated critical habitat in the Jumpoff Joe watershed, although federal agencies are still responsible for surveying habitat within 50 miles from the coast. Nesting habitat for marbled murrelet consists of older forest stands with trees that have large moss-covered limbs and a high (70%) canopy closure. This habitat is further defined by its distance from the coast. Based on BLM inventory information and field verification of McKelvey rating, approximately 3,535 acres of suitable marbled murrelet habitat are found on BLM land in the watershed. This land, for the most part, corresponds with spotted owl suitable/optimal habitat (see McKelvey map). There are no known nest locations within the Jumpoff Joe watershed. It is unknown at this time if the stand that contains components for marbled murrelet would be used by them. These sites are generally warmer and drier than those located closer to the coast that are occupied by nesting murrelets. The BLM is currently conducting surveys in proposed project areas and has not detected these birds.

Bald Eagles (Threatened) - There are no known nest sites documented within the watershed. Nesting habitat does occur on federally-administered land. Preferred nesting habitat consists of older forest, generally near water, with minimal human disturbance.

Peregrine Falcon (Threatened) nests on ledges located on cliff faces. There are no known historic or current peregrine falcon nests in the watershed.

9. Other Species of Concern

Neotropical Migratory Birds - A number of neotropical birds are known to inhabit the Jumpoff Joe watershed. Neotropical migrants are species of birds that winter south of the Tropic of Cancer and breed in North America. More then twenty years of Breeding Bird Surveys (BBS), Breeding Bird Census (BBC), Winter Bird Population Study and Christmas Bird Counts indicate that many species of birds are experiencing a precipitous decline. This

is particularly true for birds that use mature and old-growth forest either in the tropics, in North America or both (DeSante & Burton 1994). Rates of decline are well documented for birds on the east coast of North America, and less so on the west coast. In 1992 the BLM signed a multi-agency agreement called "Partners in Flight." The purpose of this program is to establish a long-term monitoring effort to gather demographic information. This monitoring will establish the extent that deforestation and forest fragmentation have on temperate breeding bird populations.

The Jumpoff Joe watershed contains a number of neotropical migrants that utilize various habitats. Studies conducted on the Medford District have found that neotropical migrants comprise between 42% and 47% of the breeding species at lower elevation forests dominated by Douglas-fir (Janes 1993). In higher elevation forests dominated by white fir, neotropical migrants are less abundant, contributing to a smaller portion of the bird species present. In 1994 a bird point count was established in the Louse Creek drainage. The purpose of this project was to establish baseline data on the presence and absence of avifauna. A number of neotropical birds were detected during the 1994 and 1995 season. Table III-35 lists the known and suspected neotropicals found in the watershed, habitat used, and national population trends. Habitats of particular concern are valley brushfields, old-growth, riparian and oak woodlands communities. It is important to keep in mind neotropicals will often use more than one habitat type during various seasons. Overall, 46% of these birds are habitat generalists using four or more habitat types, while 34% are habitat specialists utilizing one or two habitats.

Table III-35: Neotropical Bird Potential in the Jumpoff Joe Watershed

Common Name	Presence	Trend*
Green-winged Teal	Unknown	Insufficient data
Sora	Unknown	Insufficient data
Turkey Vulture	Present	Decline
Osprey	Unknown	Stable or increasing
Flammulated Owl	Unknown	Insufficient data
Common Nighthawk	Unknown	Insufficient data
Rufous Hummingbird	Present	Decline
Calliope Hummingbird	Unknown	Insufficient data
Western Kingbird	Suspected	Insufficient data
Ash-throated Flycatcher	Suspected	Insufficient data
Western Wood-pewee	Suspected	Decline
Olive-sided Flycatcher	Present	Decline

Table III-35: Neotropical Bird Potential in the Jumpoff Joe Watershed

Common Name	Presence	Trend*
Hammond's Flycatcher	Suspected	Insufficient data
Dusky Flycatcher	Suspected	Insufficient data
Pacific-slope Flycatcher	Present	Insufficient data
Vaux's Swift	Unknown	Decline
Tree Swallow	Suspected	Insufficient data
Northern Rough-winged Swallow	Suspected	Insufficient data
Violet-green Swallow	Suspected	Decline
Cliff Swallow	Suspected	Insufficient data
Barn Swallow	Suspected	Decline
House Wren	Present	Insufficient data
Blue-grey Gnatcatcher	Suspected	Insufficient data
Swainson's Thrush	Present	Decline
Solitary Vireo	Present	Insufficient data
Warbling Vireo	Present	Insufficient data
Townsend's Warbler	Unknown	Insufficient data
Hermit Warbler	Present	Insufficient data
Black-throated Grey Warbler	Present	Insufficient data
Nashville Warbler	Present	Insufficient data
Macgillivray's Warbler	Suspected	Insufficient data
Yellow Warbler	Present	Insufficient data
Orange-crowned Warbler	Present	Decline
Common Yellowthroat	Suspected	Stable/Increase
Yellow-breasted Chat	Unknown	Insufficient data
Wilson's Warbler	Suspected	Decline
Brownheaded Cowbird	Suspected	Decline
Northern Oriole	Suspected	Decline

Table III-35: Neotropical Bird Potential in the Jumpoff Joe Watershed

Common Name	Presence	Trend*
Western Tanager	Present	Decline
Chipping Sparrow	Unknown	Decline
Green-tailed Towhee	Unknown	Stable/Increase
Black-headed Grosbeak	Present	Stable/Increase
Lazuli Bunting	Suspected	Insufficient data

* Based on information from Partners in Flight in Oregon and might not necessarily represent nationwide figures.

Game Species - Species of game animals located within the Jumpoff Joe watershed include: elk, blacktailed deer, black bear, mountain lion, wild turkeys, ruffed grouse, blue grouse, grey squirrels, mountain and valley quail. The watershed is located in the Evans Creek game management unit. Management of game species are the responsibility of the Oregon Department of Fish and Wildlife (ODFW). The entire watershed is open to hunting during the appropriate season for game species. Information from the ODFW indicates that blacktailed deer populations are stable overall and meeting department goals. Elk are present in the watershed with recent reports of herds on Sexton and Walker Mountain. A growing elk herd is found in the watershed to the north (Grave Creek) and is most likely using parts of the Jumpoff Joe watershed. Recent elk sign was noted in T34S,R5W, Section 13, near a small meadow and T35S,R5W, Section 7, on Walker Mountain.

Black bear populations are extremely hard to monitor due to their secretive nature. The population in the watershed appears to be stable. Cougar sightings in the watershed have increased with their overall population on the rise. A cougar was killed near Red Mountain due to a nuisance complaint in 1995.

Grouse and quail had an excellent nesting year in 1996. The population of these birds is cyclic depending on weather conditions. Long-term trends appear to be stable. Wild turkeys have not been introduced in this watershed, but appear to have established themselves from adjacent watersheds. A turkey release occurred in the upper Grave Creek area a few years ago. The ODFW received complaints about a flock of turkeys in the Jumpoff Joe Creek drainage and trapped the birds from the area. It was not determined if the birds were wild or domestic stock gone wild.

In general, game species are generalists that benefit from edge habitats. Past land management practices both on private and federal lands have increased the overall amount of forest edge within the watershed. In addition, the amount of roads has also increased which in turn impacts the suitability of all habitat types. High road densities have shown to have negative affects on deer and elk populations, and lead to increase poaching opportunities. For these species numbers could be expected to increase with a decrease in the road densities. Remaining unroaded sections offer key refugia for these species.

Band-tail pigeons *(Columba fasciata)* are known to occur in the watershed. These birds have shown a precipitous decline in population throughout its range since monitoring began in the 1950's (Jarvis *et al.* 1993). These birds are highly prized as a game species and restrictive hunting regulations have not led to an increase in bird populations. Habitat alteration due to intensive forestry practices may partially explain their decrease in population. Ongoing research is now trying to answer this question (Jarvis *et al.* 1993). Band-tail pigeons are highly mobile and utilize many forest habitat types. Preferred habitat consists of large conifers and deciduous trees interspersed with berry and mass producing trees and shrubs. In the spring and fall large flocks are seen migrating through the watershed. The birds use this higher elevation feeding on blue elderberries, manzanita berries and Pacific madrone berries. With the exclusion of fire from the landscape many stands of mast crop producing plants have been negatively impacted.

Cavity dependent species such as western bluebirds and northern pygmy owls *(Glaucidium gnoma)*, which use downed logs, are of special concern in the watershed because of past silvicultural practices. These practices focused on even-aged stand management and have resulted in deficits of snags and down logs in areas previously harvested. Fire suppression also has a negative effect on the amount of snags in the watershed. Fires, insect infestations and other disturbance events are important generators of snags. Species associated with this habitat type have also declined.

Exotic Species - Many non-native species have become established in the watershed. Introduced exotic species compete with native species for food, water, shelter and space. Bullfrogs (*Rana catesbeiana*) directly compete with native frogs and consume young western pond turtles (*Clemmys marmorata*). Opossums (*Dedelphis virginiana*) occupy a similar niche with our native striped skunk (*Mephitis mephitis*) and raccoon (*Procoyon lotor*). They also consume young birds, amphibians and reptiles. Other introduced species include European starlings (*Sturnus vulgaris*), ring-necked pheasants (*Phasianus colchicus*) and turkeys (*Meleagris gallopavo*). These species have some negative impacts on native flora and fauna.

IV. Reference Condition

A. Purpose

The purpose of this section is to explain how ecological conditions have changed over time as the result of human influence and natural disturbances, and to develop a reference for comparison with current conditions and with key management plan objectives (Federal Guide for Watershed Analysis, Version 2.2, 1995).

B. Climate

The climate of southwestern Oregon has not been static. During the Holocene (the past 10,000 years), shifts in temperature and precipitation affected the type and extent of vegetation, the viability of stream and river flows, fish and animal populations, and human access to higher elevations. Although direct evidence of the past climate and environment is lacking for southwestern Oregon, the broad patterns of climate change experienced throughout the American West can serve as a model. In general, at the beginning of the Holocene, temperatures were rising and the climate was warmer and drier than today. This trend continued until sometime after 6,000 years ago, when wetter and cooler conditions began to appear. During the past few thousand years modern climate patterns and vegetation regimes have prevailed. However, during this period the environmental forces have not been constant. Fluctuating cycles of drier or wetter conditions, varying in duration, characterize the modern climate pattern (Atwood and Grey 1996).

This long period of drier and warmer conditions in southwestern Oregon began to change at some point in the mid Holocene. The onset of wetter, cooler conditions gradually changed vegetation patterns, as well as the quantity and distribution of game animals and migrating fish (Atwood and Grey 1996).

C. Erosion Processes

The historical erosion processes are generally the same as those described under the Current Conditions section. Native people probably did not accelerate the rate of movement by their burning practices because they did not burn on very steep slopes. Native burning practices generally involved burning near level to gently sloping areas in valley bottoms and footslopes and in upland meadows. Their fires were spotty and designed to enhance habitats and thus increase numbers of desirable plant and animal species (BLM 1997). The referenced document refers to conditions in southwestern Oregon with specific application in Grave Creek watershed. A cursory review of the General Land Office (GLO) maps with notes that were published in the 1850's and 1991 aerial photos indicate that these types of practices did take place.

Concentrated flow (gully and rill) erosion occurred mainly in draws where channels were created. The density of these channels varied with climatic cycles. During wetter cycles the intermittent stream channels were more

common. During dry cycles, cobbles, gravel, and plant debris accumulated in the draws, burying the channel. It is doubtful that the native people burned vegetation in the draws. Therefore, their effect on this process was probably minimal.

Mass movement or slides may have occurred in the areas of Dubakella, Cornutt, and other deep, fine textured soils. This is based on the existence of thick clay subsoils and thick pockets of clay. Also there are some apparent slide deposits that have stabilized in these soil areas (see Geology Map 6a and 6b). It is doubtful native people's land management practices affected the rates of mass movement. Acceleration of mass movement can be caused by a reduction of root strength and/or an increase of moisture content, a result of decreased transpiration. The native people's burning practices had its greatest effect on shallow rooted plants that rapidly regenerated. Plants with the greatest root strength at depth were negligibly effected.

1. Road Density

Native peoples obviously did not build roads. Their narrow foot trails had very little effect on erosion, stream water quality and quantity.

2. Forest Soil Productivity

There was probably little effect that would change productivity on serpentine-influenced soils due to native people's burning practices. Sites on the moderately deep serpentine soil, (Dubakella) were probably periodically burned by the native people. The stands maintained less fuel loading than exists today due to periodic burning. The fires were generally spotty, so the effects were minimal. Small, localized reduction in productivity may have occurred due to loss of surface litter and duff, but the decline of fire hazard by reducing fuel correlates to long-term maintenance of soil productivity with reduced probability of a hot stand replacement fire.

D. Hydrology

Previous to Euro-American settlement there were more mature forests in the Jumpoff Joe watershed. The forest vegetation intercepted the precipitation, the coarse woody debris and organic material on the forest floor protected the soil from erosion and aided in filtering out sediments before the water entered the streams (USDI BLM 1996).

1. Floods

Periodic flooding within the Rogue River basin has had devastating consequences on the cultural environment. The rare combination of a warm southwesterly storm system with several inches of rain and an existing snowpack has, at times, produced a massive melt and runoff causing major floods along the Rogue River and its principal

tributaries. High water has occurred frequently on the Rogue through the years and indications are that floods similar to modern ones occurred historically (Atwood and Grey 1996).
Historic floods occurred in 1853 and 1859. The flood of December 1861 was the largest flood on record on the Rogue River. In that year, severe flooding inundated fields along the Rogue River plain west of Grants Pass and destroyed improvements and crops along the Rogue River in the agricultural section from the Applegate River to the mouth of Jumpoff Joe Creek. Other major floods of record also occurred in 1890, 1927, 1955, 1964, and 1974. Less severe flooding took place in 1864, 1881, 1893 and 1903 (Atwood and Grey 1996).

River flows were high enough during these major flood years to destroy bridges, roads, built improvements, mining structures, and to inundate agricultural lands and stream courses. No written record exists of flood impact on human improvements, soil vegetation or aquatic life before Euro-American settlement and development, although certainly catastrophic 100-year floods occurred then, as in the recent past (Atwood and Grey 1996).

E. Stream Channel

Historically, the steep, headwater streams in the Jumpoff Joe watershed probably had adequate amounts of coarse woody debris to create a step/pool profile (USDI BLM 1997). Forests along the streams provided shade and an abundant source of coarse woody debris (as a result of tree mortality). The lower reaches of Jumpoff Joe Creek and Louse Creek were probably more sinuous and, therefore, the streams were longer and more complex with more aquatic habitat available, which also allowed more surface area for the water in the stream channel to recharge the groundwater (USDI BLM 1996).

Less sediment was available to the stream system prior to mining and road construction activities. Less sediment was transported out of the stream system and deposition was greater than today because coarse woody debris was more prevalent, which trapped sediment (USDI BLM 1997).

Beavers were abundant in the Jumpoff Joe watershed prior to the arrival of fur-trappers in 1827 (Atwood and Grey1996). Beaver dams added woody material to streams, trapped and stored fine sediments, and reduced water velocities. The loss of beaver dams likely resulted in scouring of channel beds and banks, increased width/depth ratios, and fine sediment deposition in pools (USDI BLM 1997).

Considerable placer mining was done on Jumpoff Joe and Louse Creeks (Brooks 1968). Hydraulic mining caused channels to become more entrenched with increased width/depth ratios. Sinuosities were lowered as stream gradients increased. Sediment transport increased and pools were filled with fine sediment (USDI BLM 1997).

F. Water Quality

Overall, prior to Euro-American settlement, historic summer water temperatures were likely lower than today due to lower width/depth ratios and more riparian vegetation. Given the fire occurrence prior to

1920 some stream reaches could have been sparsely vegetated for periods of time, resulting in higher water temperatures (USDI BLM 1997).

Ranching, farming and mining in the late 1800's and 1900's resulted in a reduction in riparian vegetation allowing more solar radiation to reach the streams. Increased water temperatures were likely a result of this activity. Irrigation withdrawals lowered stream flows and increased stream temperatures (USDI BLM 1997).

Sediment loads and turbidity levels were probably lower due to fewer sediment sources prior to Euro-American influences. Sedimentation and turbidity rose dramatically in conjunction with hydraulic mining, while land clearing and road building by settlers provided an additional source of sediment to streams (USDI BLM 1997).

G. Vegetation

Historical vegetation patterns or reference condition alludes to the forests or vegetation that existed on a site prior to significant Euro-American modification. Examples of significant Euro-American modification include clearing for settlement and agriculture, human development (homes, buildings, roads, etc.), timber harvesting, mining, grazing and fire suppression.

The information gathered is from the O&C revestment notes. The inventories were done to determine: the economic worth of the land at that time, how much timber volume was present, and how the land should be used. Every 40-acre parcel of O&C land was surveyed. Although some of the notes were hard to comprehend, one may draw some conclusions of what the general landscape looked liked circa 1920.

Enough information is present in the old surveys to develop an approximate major plant series map. The information in the survey notes described the conifers present in both the overstory and understory, the amount of board feet present at that time, the major hardwood species (madrone, oak, etc.), the dominant brush species such as ceanothus or manzanita, and whether or not there were any recent signs of fire events.

The data shown below summarizes the historic major plant series within the Jumpoff Joe watershed. This is shown to give an idea of past vegetation in the Jumpoff Joe watershed and does not represent exact acreage totals by series, mature/late-successional habitat, or for fire events. The board foot per acre totals are broken out showing percent of the Jumpoff Joe with equal to or greater than 10,000 board feet per acre. This is done for two reasons: 1) to show the amount of "high volume" acres in the Jumpoff Joe watershed in 1920, and 2) to give an estimate of suitable habitat for late-successional dependent species. Ten thousand board feet per acre will be considered the low end for this type of habitat. Cruise data from the 1920 notes are based on different methods

and standards. The yield is a conservative estimate by today's standards (Harris 1984).

Table IV-1: Historic Major Plant Series Within the Jumpoff Joe Watershed - 1920

Major Plant Series	No. of Acres	Percent of Total BLM Lands	Acres Burned	Percent by Series/ Watershed	Acres of Mature/Late-Successional Habitat	Percent by Series/ Watershed
Douglas-fir	15,520	60.7	960	6.2 / 3.8	2,880	18.6 / 11.3
Jeffrey Pine*	960	3.8	240	25.0 / 0.9	0	0.0 / 0.0
Non-timber	440	1.7	40	NA / 9.1	0	NA / 0.0
Ponderosa Pine	6,620	25.9	560	8.5 / 2.2	40	0.6 / 0.2
White Fir	1040	4.1	0	0.0 / 0.0	880	84.6 / 4.1
Western Hemlock	40	0.2	0	0.0 / 0.0	40	100.0 / 0.2
White Oak	940	3.7	80	8.3 / 0.3	0	0.0 / 0.0
Totals	**25,560**	**100.1****	**1,880**	**NA/7.4**	**3,840**	**NA/15.0**

* Due to the unique nature of Jeffrey pine sites, the true acre figures for this series are considered to be lower than what truly exists. These sites may be represented in the revestment notes as non-timber or Ponderosa pine. The 1996 inventory is a more accurate representation of the amount of land with the Jeffrey pine series present.

** Totals greater than 100% due to rounding up.

Major plant series is an aggregation of plant associations with the same climax species dominant(s). The Jeffrey pine series, for example, consists of plant associations in which Jeffrey pine is the climax dominant. It defines the potential natural vegetation that would exist on the site at the climax stage of plant succession, or the end point of succession where neither the plant composition nor stand structure changes. Net productivity in terms of biomass production is considered to be zero (Atzet and Wheeler 1984).

A map entitled "Plant Series Circa 1920" shows the approximate locations of the plant series within the Jumpoff Joe watershed and is available for viewing at the Medford District Office.

1. Landscape Patterns

   a. Fire events primarily took place on ridgetops and warmer aspects. A significant exception to this is the land around Merlin. Approximately 40% of the acres that were recorded as being burned were within two miles of the town.

b. The majority of the Ponderosa pine series (approximately two-thirds) is located in the Quartz Joe subdrainage on the west side of the Jumpoff Joe watershed.

c. The Douglas-fir series occurs primarily in the Joe Louse subdrainage and at the upper elevations (the periphery) of the Quartz Joe drainage.

d. The white fir and western hemlock series are situated predominately on the eastern side of the Jumpoff Joe watershed (higher elevations and cooler microsites). There are two white fir sightings along Jumpoff Joe Creek in 35-6-19 (Quartz Joe).

e. Plant series with infrequent high-intensity fires has a much higher percentage of mature/late-successional structure than those with a shorter fire return interval.

H. Human Uses

1. Cultural/Historical Use

Archeological evidence indicates that human occupation of southwest Oregon dates back about 10,000 years. During these prehistoric times the native inhabitants occupied southwest Oregon and minimally impacted the physical landscapes. The native inhabitants of the area are generalized as hunters and gatherers.

The first known whites to enter the Rogue Valley passed through in early 1827. They belonged to a party of Hudson's Bay Company trappers from Fort Vancouver under the leadership of Peter Skene Ogden. The Hudson Bay Company trappers continued to visit the area for several years. Other trappers and explorers made periodic visits to the area up to the time of the discovery of gold in Jackson County.

Gold was discovered on Jackson Creek (near present day Jacksonville) in the Rogue Valley in late 1851, or early 1852. Although gold was previously discovered elsewhere along the Applegate and Illinois Rivers, this gold discovery brought an influx of thousands of miners to the region.

In 1853, a military road was built and traverses the watershed from the north to south. It appears after review of maps of the area that the road enters the watershed from the north at the saddle on Shanks Creek that divides Grave Creek from Jumpoff Joe Creek.

As mentioned in the Characterization section, the land ownership pattern of the watershed was primarily molded in the late 1800's and early 1900's. The lands in the watershed in the mid 1800's were public lands owned by

the United States and administered by the General Land Office. The first primary transfer of public lands out of ownership by the United States was to the State of Oregon following statehood in 1842.
In order to further develop the west, Congress passed several laws enabling settlers to development and obtain ownership of the public lands. These laws included Donation Land Claim patents, entry under the Homestead Acts, military patents, and mineral patents. In addition to these types of deeds, land was deeded to the Oregon and California Railroad, with some of those lands being sold to private individuals. In reviewing the master title plats for the Jumpoff Joe watershed, it is apparent that ownerships of several of the low elevation lands were originally deeded from the United States to private individuals through the above Acts of Congress.

The Oregon and California Railroad was constructed in the late 1800's. The railroad enters the watershed at the tunnel northwest of Hugo. The railroad then passes through old stations at Hugo, Three Pines and Merlin.

Gold mining began within the watershed in the late 1800's. The majority of the mining appears to have been hard rock mining, however, several placer mines operated on Jumpoff Joe Creek.

The Lucky Queen Mine was about two miles east of present Interstate 5 and a half mile west of Winona. The area around the Lucky Queen Mine was the Lucky Queen voting precinct. The Lucky Queen Post Office was opened December 13, 1876 with David H. Sexton as postmaster. The office was closed July 24, 1896.

The town of Mountain was near the Lucky Queen Mine. It appears to have been the sawmill camp for the Three Pines Lumber Company. The logs were cut into lumber and flumed to the Three Pines Lumber Company. The Mountain Post Office opened November 30, 1908, but closed on March 31, 1913.

The town of Winona was located on Jumpoff Joe Creek and was three and a half miles east of present Interstate 5. A post office was opened there in June, 1897 with Herbert Gorham as the first postmaster. The office was closed January 31, 1905.

The Granite Hill Mine, now patented, is located primarily along Louse Creek with another associated mine known as the Redjacket Mine. When the Granite Hill Mine was in operation, it was equipped with a 20-stamp mill, four 10-foot amalgamators, a crusher, and other mining equipment. The majority of the miners lived adjacent to the mine.

The Ida Mine was located about a mile above the Granite Hill Mine. These are unpatented lands. The early mining activities included cyanide leaching. This proved unsuccessful with conventional mining practices following. Besides common mining equipment on the claim there was an assay office, blacksmith shop, camp buildings, etc. Both the Granite Hill and Ida Mines were operational until around World War II.

The Northern California Dredging Company set up a dragline "doodlebug" dredge with a rated capacity of 1,500

cubic yards per day on the Jumpoff Joe placer in 1941. The period of operations is not reported, but it is believed to have been short lived.

The Swastika placer on Jumpoff Joe Creek near the mouth of Jack Creek was operated for several years before 1910. Placer mining had also been done on Jack Creek and nearby Horse Creek. The Sexton placer on Bummer Gulch near the head of Jumpoff Joe Creek was also active during the 1930's.

The Orofino Mine included 1,400 feet of shafts and adits. The first work of importance at the mine was done in 1898. Total production is unknown, but 14 carloads of high grade ore were reportedly shipped to the smelter before 1914, and some lower grade was concentrated in a small mill prior to 1929. (All the above information taken from Josephine County Historical Highlights I and II, 1976)

2. Roads

Before settlement of the west, ground disturbances were caused by animal trails and forces of nature. As the west developed, trails became narrow roads used to transport people and supplies. These roads were generally natural surface with the amount of sediment flow dependent upon use, location, weather conditions, and soil type. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways began as trails and are now widened, realigned, and surfaced to meet the increase and change in vehicle traffic. Even with the increase in traffic flow, crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainage have actually decreased sedimentation and erosion along the original natural surfaced roads.

3. Recreation

Until the 1930's, much of the land in southern Oregon was inaccessible. Trails existed primarily for access and were not used specifically for recreation. The 1930's brought about the Civilian Conservation Corps, which, along with other duties, was responsible for building roads. These new roads provided recreation opportunities that were not previously accessible to many people. People began using roads to access sites for hiking, camping and driving for pleasure. According to an Oregon forester at the time, "Motorists and campers moved into areas previously unreachable or discovered alternative shortcuts to favored recreation spots . . . Where there are roads, you'll find the public." (McKinley and Frank 1995)

I. Fire

The historical fire regime of the Jumpoff Joe watershed was dominated by a low-severity regime. The low-severity fire regime is characterized by frequent (1-25 years) fires of low intensity (Agee 1990).

Fires in a low-severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire than in its absence (Agee 1990). Frequent, low-severity fires keep sites open so that they are less likely to burn intensely even under severe fire weather. Limited overstory mortality occurs. The majority of the dominant overstory trees are adapted to resist low-intensity fires because of thick bark developed at an early age. Structural effects of these fires are on the smaller understory trees and shrubs.
These are periodically removed or thinned by the low-intensity fire along with down woody fuels. The understory density was low, open, and "park like" in appearance.

With the advent of fire exclusion, the pattern of frequent low-intensity fire is ended. Dead and down fuel and understory vegetation are no longer periodically removed. Species composition changes and thinner bark, less fire resistant species increase in numbers and site occupancy. This creates a trend toward an ever increasing buildup in the amounts of live and dead fuel. The understory of stands becomes dense and "choked" with conifer and hardwood reproduction. The longer interval between fire occurrence allows both live and dead fuel to buildup. This creates higher intensity, stand replacement fires rather than the historical low-intensity ground fire that maintained stands.

1. Social Concern - Air Quality

Poor air quality due to natural and prescribed (human) fire has been a historical occurrence in the spring, summer, and fall seasons for southwest Oregon. Numerous references are made by early Euro-American explorers and settlers to Native American burning and wildfire occurrence in southern Oregon. Smoke-filled sky and valleys were once typical during the warm seasons. Air quality impacts from natural and prescribed fire declined with active fire suppression and the decline in settlement and mining burning. Factors influencing air quality shifted away from wildfire and human burning to fossil fuel combustion as population and industry grew. This created a shift in the season of air quality concern to the winter months when stable air and poor ventilation occurs. By the 1970's, fossil fuel emissions became the major factor along with wood stove and "backyard" burning. Prescribed burning related to the forest industry increased throughout this period and was an additional factor, particularly in the fall season. Regulation of prescribed burning smoke emissions and environmental regulation of fossil fuel combustion sources has lead to a steady improvement in air quality since the 1970's.

Air quality as a reference condition is determined by legal statutes. The Clean Air Act and the Oregon State Air Quality Implementation Plan have set goals and objectives. Management actions must conform so that effort is made to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration, and the Oregon Visibility Protection Plan and Smoke Management Plan goals.

J. Species and Habitats

1. Special Status Plants

It can be postulated that the habitat for late-successional special status species (the *Cypripedium* sps. and *Allotropa virgata)* was once more extensive in the watershed before timber harvest was common. Even though larger condition classes do exist in the watershed today, it is impossible to know which pre-settlement habitats harbored orchid populations and how extensive they were in the past. The micro-habitat required was most likely more abundant and contiguous with frequent, low-intensity fires helping to maintain a competitive edge for these species in the herbaceous layer. Due to the complex life history of these plants, they were probably never a dominant species in the herbaceous layer, but they could have occurred more frequently in the watershed and with higher numbers of plants per population area if moister, shaded microsite conditions occurred more frequently.

Since serpentine habitats occur because of unusual soils their area was probably similar to and contained the same type of plants as today, but at higher levels of diversity. The low-intensity, more frequent fires of the past probably helped to promote this higher species diversity. These areas were also probably more extensive in size because the fires prevented encroachment from trees and shrubs. There was probably a higher prevalence of *Camassia howellii*.

Valley habitats were much more prevalent than currently exist since the majority of settlement has occurred in these lowlands. More openings probably existed since fire frequencies were higher due to lack of suppression. It is hard to imagine the extent and diversity that must have existed before highways, developments, golf courses and shopping areas fragmented these habitats. *Limnanthes gracilis var. gracilis* was most likely more prevalent since wetland areas were less impacted from development and domestic water withdrawal. Noxious weeds were nonexistent before the advent of European settlers.

The rock outcrops that are habitat for *Sedum moranii* and *Chlorogalum angustifolium* were probably of the same extent in past time on BLM land. The outcrops may have been more pristine (untouched) before the introduction of off-highway vehicles and rock quarrying in certain areas of the watershed. Data is not available for private lands in the watershed where removal of rock outcrops may have occurred.

2. Fisheries

Pre-Euro-American Settlement: A pre-Euro-American depiction of the Jumpoff Joe watershed would likely have included robust populations of beaver and salmon, a mixture of mature conifer and hardwood riparian areas, large woody material or logs distributed through the stream and riparian area and plenty of cool, clear water. There probably was an abundance of fish in most streams. Native Americans relied heavily on salmon, steelhead, lamprey and suckers for subsistence and ceremonial purposes.

Prior to Euro-American settlement, valley streams meandered with unconstrained channels. Multiple stream channels dissipated flows and created fish habitat. Stream channels contained larger amounts of large woody

debris for insect and fish production, low water temperatures ideal for salmonids, and low sedimentation in the gravels or stream substrate.

Post-Euro-American Settlement: Euro-American settlers trapped beaver extensively and over the decades began the reduction in numbers of coho salmon. As beaver numbers decreased so did the amount of summer juvenile coho salmon habitat or pools and small ponds. Settlers cleared the floodplains and adjoining lands. The lands were drained and streams channelized. Stream meander was eliminated along with the connectivity of the stream with its floodplain. Jumpoff Joe Creek was one of the favorite trout fishing areas because of its easy access from roads, which were created for mining purposes.
Hydraulic mining operations were at a peak from 1890 to 1910. Hydraulic mining continued but decreased slowly until 1930. Mining caused excessive silt in the streams and high mortalities of salmonids.

The number of irrigation diversions increased and water rights were over-appropriated for agricultural use in the 1900's. Timber harvest was at a minimum until the late 1800's and accelerated in the 1980's. Both of these land use practices decreased available habitat for coho salmon. Irrigation of farmlands dries up streams and prevents juvenile yearling fish migration, upstream and downstream, to seek cooler waters.

Salmon were so abundant that prior to 1920 people paid little attention to dead salmon in their fields. Adult and juvenile salmon migrated into irrigation canals and subsequently onto farmlands. A few ranchers recognized the fish as good fertilizer, yet most people thought the salmon resource couldn't be hurt because of the high numbers. People didn't start recognizing there was a problem until 1901, yet the problem didn't attract a lot of attention until 1917.

Jumpoff Joe Creek had a concrete dam impassable to salmon during low flows in 1959. Louse Creek had a dam at Bates Lumber Company which posed a problem for fish.

Coho salmon numbers have decreased by 90% since 1970. Coho production potential and habitat complexity has subsequently decreased as a result of agricultural practices, mining practices, timber harvest and road activities. Fish numbers were very high during the 1800's and early 1900's. Overharvest of anadromous fish also reduced numbers in the late 1800's and in the early 1900's.

Redside shiners were first found in Jumpoff Joe Creek in 1957. This was the first observation of their appearance in the Rogue River basin. Shiners were found extensively throughout most of the Rogue River basin in 1958.

The combination of all these decimating factors caused a cumulative impact and consequently reduced fish numbers, especially coho salmon.

3. Wildlife

A pre-Euro-American depiction of the Jumpoff Joe watershed would be dramatically different than one would see today. Native Americans were managing the landscape for habitats and products they found useful. Fires were used to burn off undesirable vegetation, and to promote growth of desired products. Wildlife was extensively used by these people to meet their everyday needs. Human exploitations of these wildlife resources were at a sustainable level. Each species maintained its role in an intricate food chain, where their presence benefitted the community as a whole. Large predator species such as grizzly bear, and wolves *(Canis lupus)* were present in the watershed (Bailey 1936) and, along with cougar *(Felis concolor)* and black bear *(Ursus americanus),* maintained the balance of species such as Roosevelt elk *(Cervus elaphus)* and blacktailed deer *(Odocoileus hemionus)*. Predator species kept herbivorous species in balance with vegetation. Predator species also benefitted other community members like ground nesting birds. They harvested small mammals such as raccoons *(Procyon lotor)* that fed on the young birds. Predators also made carcasses available in the winter that benefit species as diverse as the striped skunk *(Mephitis mephitis*) and the black-capped chickadee *(Parus atricapillus*).

The landscape was open and the movement of animals was unrestricted. Many animals would migrate with the seasons to take advantage of food, shelter and water. Black bears in the early spring sought green grass to activate their digestive system. Winter kills that remained were utilized by the bears at this time. During early summer California ground-cone *(Boschniakia spp.)* became an important part of their diet until berries were available. As fall approached, the salmon returned to the river, spawned and died. This abundant food source was available to a host of consumers and scavengers. Deer and elk also followed the seasons. Winter was primarily spent in the oak/savannahs. As the seasons progressed they would enter the uplands, until fall arrived. Other species such as the wolverine *(Gulo gulo luteus)* remained at high elevation throughout the year. This species was an opportunistic predator, feeding on animals such as porcupines *(Erithizon dorsatum)* and occasional winter kills.

Historically, the valley floor was dominated by an open stand of large conifers and oak/madrone/grasslands kept free of brush due to fire. Maps produced in 1856 through 1894 by the General Land Office characterize this area as "gently rolling country with open Oak, Fir and Pine timber." This habitat provided nesting areas for various species, mast crops of acorns for wildlife forage, and big game winter range. A variety of bird species such as the acorn woodpecker *(Melanerpes formicivorus),* western blue birds *(Sialia mexicana*) and Lewis' woodpeckers *(Melanerpes lewis)* were intricately tied to these stands. Species such as the sharptailed snake *(Contia tenuis),* the common kingsnake *(Lampropeltis getulus)* and the mountain kingsnake *(Lampropeltis zonata)* used the grassland-riparian interface area as their primary habitat. The open condition and the grass were highly beneficial to a number of game animals, and ground nesting birds. Deer and elk used this area for winter range. In turn, game animals provided sustenance for a host of predators species. Grey foxes *(Urocyon cinereoargenteus)* used the valley, and nearby brushy slopes as their primary habitat.

The area found above the valley floor was dominated by conifers. Stages of stand development varied due to disturbance events such as fire. Forests found on north and east facing slopes were generally multi-canopied, with large amounts of snags, down wood, and large trees. South and west facing aspects were composed of stands with a higher fire return interval, and were often devoid of large amounts of down woody material. The amount of old-growth forest historically found in the watershed varied through time in response to disturbance events. Old-growth/mature forest was the dominant forest type in southwestern Oregon prior to Euro-American settlement, ranging as high as 71% (Ripple 1994).

Species that benefitted from these forests such as the pileated woodpeckers *(Dryocopus pileatus)*, northern flying squirrels *(Glaucomys sabrinus)* and red tree voles *(Phenacomys longicaudus)* were found in greater numbers than they are now. Dispersal of animals, recolonization of former habitats, and pioneering into unoccupied territories, was accomplished more effectively than it is today due to the connectivity of the older forest. Ripple (1994) estimated that 89% of the forest in the large-size class was in one large connected patch extending throughout most of western Oregon. Due to the connectiveness of mature habitat, species that benefitted from edge environments, like striped skunks *(Mephitis mephitis)*, were less common than they are today.

Snags were more numerous than they are today and species that use snags for their primary habitat were more common. Numerous disturbance events such as fire, windthrow, and insect infestations played an important role in snag production. Due to the increased habitat, species that use snags were more common than they are today. Species such as the northern pygmy owl *(Glaucidium gnoma)*, western screech owl *(Otus asio)*, and northern flicker *(Colaptes auratus)* had more habitat than what is currently available.

4. Riparian

Prior to the settlement of the valley, pristine streams flowed from their source to the Rogue River. Water quality was extremely high. Seeps, springs, snow, and riparian vegetation all contributed to keeping the water cool. During the winter and spring occasional floods would flush the system clear of sediment deposited from natural slides and erosion. Stream courses in uplands were primarily lined by conifers with a narrow band of deciduous trees and were well defined by entrenched channels. As the stream dropped to the valley floor, wide floodplains were developed and the streams begin to meander taking on a variety of courses from year to year. These highly sinuous stream systems consisted of undercut banks, oxbows, and woody material that created a diverse aquatic system and associated habitats. Here, the riparian zone would have widened, with deciduous trees playing a more important role than they did in the uplands. Due to higher humidity, conifers near the streams resisted burning, allowing them to mature, resulting in heavy loading of large woody debris in the water. Adding to the diversity was a myriad of wildlife species. Beavers *(Castor canadensis*) acted as a keystone species, creating backwater sloughs behind their dams, and adding finer woody material to the stream. This fine material benefitted fish, providing them with cover. Species such as ducks and geese also benefitted from the creation of ponds that provide nesting habitat. The diversity of wildlife species was not restricted to the surface as a profusion of aquatic

insects took advantage of the variety of available niches. These insects in turn supported an assortment of vertebrate species including anadromous fish. As the adult fish returned to their native streams, their carcasses would produce a rich source of food that, in turn, supported minks *(Mustela vision)*, American black bears *(Ursus americanus)*, grizzly bears, bald eagles *(Haliaeetus leucocephalus)* and a number of other scavenger species.

V. Synthesis and Interpretation

A. Purpose

The purpose of the synthesis and interpretation is to compare existing and reference conditions of specific ecosystem elements, to explain significant differences, similarities or trends and their causes, and to identify the capability of the system to achieve key management plan objectives.

B. Erosion Processes

The major changes between historical reference conditions and current conditions are due to an increase in intensity and type of human interaction with the environment. Native people's burning practices were limited to valley bottoms, gently sloping footslopes, and isolated upland meadows. The fires were spotty. This contrasts strongly with forest management that has occurred since the turn of the century.

Both on private and public lands, intensive forest management has included fire suppression, extensive road construction, and heavy logging with yarders on steep slopes and tractors on gentle to moderate rate slopes. Fire suppression has resulted in accumulation of fuels. The Walker Mountain Fire of 1988 burned over 2,100 acres and was nearly 90% a high-intensity, stand replacement fire (Tom Murphy, personal communication, 1997). A high-intensity fire consumes the duff, litter and most of the coarse woody debris. The top layer of mineral soil impacted by a high-intensity fire commonly shows color changes due to consumption of organic matter and effects of heat on the mineral components. With the loss of surface cover, erosion did occur predominately on county land where grass seeding did not occur (Cliff Oakley, personal communication, 1997).

The cumulative effects analyses of roads that were completed on six small watersheds within the Jumpoff Joe watershed showed that all six had road densities of greater than 4.0 miles per section. These small watersheds are predominately on the east side of the watershed. Of the six, upper Louse Creek, Quartz Creek, and Jack Creek should receive high priority for any proposed actions that reduce road density because of extremely high road densities and the occurrence of highly-erodible granitic soils.

Four of the six analyzed watersheds also had high levels of tractor logging resulting in a high percentage of compacted ground, areal extent (>12%). These were Fall Creek, Orofino Creek, Daisy Joe and upper Louse Creek. Much of the tractor logging was done in the 1950's, prior to the practice of designating skid roads, and it can take 60 to 70 years for soils to recover from compaction (Froehlich 1979). The effect of soil compaction by logging on forest productivity, compacted soil has reduced permeability compared to uncompacted soil. Therefore, infiltration rates are diminished and more surface concentrated that may cause erosion occurs during rain events.

C. Hydrology

The stream flow regime in the Jumpoff Joe watershed reflects human influences that have occurred since European settlers arrived (USDI BLM 1997). Changes in the stream flow regime due to human disturbance have not been quantified in the Jumpoff Joe watershed (USDI BLM 1997). Potential changes may include channel widening, bank erosion, channel scouring, and increased sediment loads.

Road construction, timber harvest and fire suppression are the major factors having the potential to adversely affect the timing and magnitude of stream flows in the Jumpoff Joe watershed. Extensive road building and timber harvest have raised the potential for increasing the magnitude and frequency of peak flows in the tributaries and mainstem. As vegetation in the harvested areas recovers, the increases in magnitude and frequency of peak flows will diminish. Permanent road systems will not allow the stream flow to return to pre-disturbance levels (USDI BLM 1997).

D. Water Quality

Changes in water quality and temperatures from reference to current conditions that can stress aquatic life are predominantly caused by riparian vegetation removal, water withdrawals, and roads. Water quality parameters known to be affected the most by human disturbances are temperature, sediment, and turbidity. Roads are the primary source of sediment in the analysis area (USDI BLM 1997).

The recovery of riparian vegetation that will provide shade should bring about the reduction of stream temperatures. Road maintenance and decommissioning would decrease sedimentation in the analysis area (USDI BLM 1997) .

E. Stream Channel

Channel conditions and sediment transport processes in the Jumpoff Joe watershed have changed since Euro-American settlers arrived in the 1830's primarily due to mining, road building, and removal of riparian vegetation. Hydraulic mining resulted in entrenched channels with greater width/depth ratios. Increases instream gradients and sediment transport were a consequence of the larger width/depth ratios (USDI BLM 1997).

Sediment is mainly transported from road surfaces, fill slopes and ditchlines. Increases in sediment loads are generally highest during a five-year period after construction; however, they continue to supply sediment to streams as long as they exist. Road maintenance and decommissioning would reduce the amount of sediment moving from the roads to the streams. Roads constructed adjacent to stream channels tend to confine the stream

and restrict the natural tendency of streams to move laterally. This can lead to down cutting of the streambed and bank erosion. Obliteration of streamside roads would improve the situation (USDI BLM 1997).

Removal of riparian vegetation has had a major detrimental effect on the presence of large woody debris in the stream channels. There is a minimal amount of large woody debris in the analysis area with many areas lacking the potential for short-term future recruitment. Large woody debris is essential for reducing stream velocities during peak flows and for trapping and slowing the movement of sediment and organic matter through the stream system. It also provides diverse aquatic habitat. Riparian reserves along intermittent, perennial non-fish bearing, and fish-bearing streams will provide a long-term source of large woody debris recruitment for streams on federal land once the vegetation has been restored (USDI BLM 1997).

F. Vegetation

Trends in vegetation in the Jumpoff Joe watershed include increasing densities of trees and shrubs within stands and a shift from historically-dominant species to species that were historically a lesser component of the landscape or found primarily in the understory. Ponderosa and sugar pine and white oak were more prevalent while Douglas-fir was less common than it is today.

The existing vegetation conditions in the watershed today are a result of fire exclusion and replacing the natural disturbance pattern with human disturbances such as logging (particularly of the high value pine species), farming and rural development.

Existing vegetation composition and pattern generates two areas of concern:

1. Fire exclusion has resulted in many of the forests in the watershed reaching densities of trees and shrubs that are not sustainable over time. In addition, fire exclusion has shifted Douglas-fir onto what were formerly Ponderosa pine and white oak sites.

2. Past harvest patterns in the watershed have resulted in removal of economically and biologically valuable tree species such as Ponderosa and sugar pine.

The vegetative and structural conditions of the forests in the watershed have seldom been constant and have changed frequently with historic disturbance patterns. Disturbance has played a vital role in providing for a diversity of plant series, seral stages, and distribution of series and stages, both spatially and temporally. The presence of fire, insects, disease, periods of drought, and the resultant tree mortality have always been components of ecosystem processes and occurred within a range of natural conditions.

Maintaining vegetative diversity and densities that are sustainable over time are important terrestrial and riparian

ecosystem processes. These mechanisms have been impacted by the shift from primarily frequent, low-intensity fire to settlement-related disturbances and fire exclusion. When forest density, species composition, structure (variety of tree sizes, presence of snags and large down logs, etc.), populations of insects, presence of disease, incidence of fire events of varying intensities, and tree mortality occur outside the range of natural conditions, components of the ecosystem process are impacted. This is the current trend for the Jumpoff Joe watershed.

The previous timber harvest patterns in the watershed have tended to simplify forest structures while the increase in fire exclusion has driven forest structure towards a higher level of complexity. This is happening particularly on sites where it is not sustainable, such as those areas that historically supported the Ponderosa pine and white oak series. Plant communities within these two series have developed another tree component, primarily Douglas-fir. Depending on the stage of stand development, this influx of Douglas-fir onto sites where historically fire events had kept Douglas-fir stocking low has added to stand complexity by providing another canopy layer beyond what would occur without fire exclusion. This additional canopy can modify the environment by providing additional shading and structure.

A high percentage of the watershed (60.3%) exists in small (5-11" DBH) and large (11-21" DBH) pole size classes. Fire exclusion this century has permitted dense pole stands to develop over much of the watershed, crowding out important mid-seral species less tolerant to shade such as Ponderosa and sugar pine, Pacific madrone, California black oak and Oregon white oak. Stands consisting of dense poles or of small diameter are more vulnerable to stand replacement wildfire.

When forests remain at unsustainable densities for too long, a number of trends begin to occur that effect stand health. Species composition, relative density, percent live crown ratio, and radial growth are all indicators of how forests can be expected to respond to environmental stresses.

Species such as Ponderosa, Jeffrey, and sugar pine, California black oak, Oregon white oak, Douglas-fir and Pacific madrone have historically been important components of the forests in the Jumpoff Joe watershed. Except for Douglas-fir, they require the less dense, more open canopy conditions that were more prevalent in the forests of the watershed prior to fire exclusion. As stand densities increase beyond the range of natural conditions, these species drop out and the forests become dominated by Douglas-fir.

The Douglas-fir series has increased from 60.7% of BLM lands in 1920 to 78.8% today. A decrease in non-forest (1.7% to 1.2%), Jeffrey/Ponderosa pine (29.7% to 14.7%), and white oak (3.7% to 1.6%) is shown over the same time period. The total percent decrease in those species requiring more open stand conditions associated with frequent, low-intensity fire, (-17.1%) is close to the increase in Douglas-fir (18.1%). Non-forest in 1920 was described by no timber volume listed on the inventory sheets. 1996 inventory data describes non-forest as non-vegetated, non-forest, and grass. The correlation is a rough one but useful for our purposes.

An anomaly in this watershed is the decline of the white fir series and the disappearance of the western hemlock series on BLM-administered lands which is not consistent with the contention that more shade tolerant, fire intolerant species are increasing. While these species persist as a component in the forest, current locations of the series do not match up with those from 1920. Instead, the white fir series is found in new locations where it was not noted in the 1920 revestment notes. This gives some plausibility to the notion that plant communities increase and decrease in size over time and move about the landscape in response to environmental stimuli. The reason for the reduction in total acres of these series (288 acres or 1.3% of BLM-administered lands) is not clear, but could be due to such things as improper mapping (1920 or 1996), change in site factors, change in climate, unknown factors, or a combination of these. The extra 0.3% is attributed to rounding errors.

The amount of the federal forestland in the watershed that currently exists in a late-successional condition is approximately 5,489 acres (25.2%). The percentage that existed in a mature condition in the reference condition is estimated to be approximately 3,840 (15%). The increase in acreage is due to sites that were classified as non-timber or were the Ponderosa pine or white oak series and now have Douglas-fir filling in which added an additional structural component. This component was not present previously due to the shorter interval between fire disturbances. Repeated low-intensity fires did not allow for the establishment of Douglas-fir at the rate now seen in the watershed.

Late-successional forest for the 1920 surveys is defined as any parcels that exceeded 10,000 board feet per acre in conifers. There would have been more volume if 1996 volume criteria was applied. For example, in 1916, conifers were cruised only if they were at least 16"DBH and only to a 12-inch top. Anything less than 16“ DBH was considered a pole and not counted as volume. Today's methods of cruising counts any conifers greater than 7" DBH and cruises all trees to a five-inch top. Consequently, by today's standards there was more volume present than listed in the revestment notes. Added to this is a hardwood component which provides structure and canopy layering. For this reason, the 10,000 board foot criteria is used. Even at this level, the Jumpoff Joe watershed only had 15% of the surveyed acres in a late-successional condition.

Based on comments in the revestment notes, by 1920, the area around Merlin had already had considerable Euro-American impact. Some of the notes indicated that by 1920 the parcels in the vicinity of the town had already been logged off. For this reason, the 15% figure quoted above should be considered a minimal level for mid/late-successional acres and prior to settlement (pre-1850), additional acres of this type of forest probably existed.

Percent live crown ratio and radial growth are physiological indicators of the tree’s ability to produce food and defensive compounds. Healthy live crowns are essential for healthy trees. When the average live crown ratios of forests drop much below 33%, the canopy's ability to support vital processes in the tree becomes diminished. Live crown ratios begin to recede (foliage on lower branches dies due to shading) as forests remain in an over-dense condition for too long. When live crown ratios are reduced too far, trees are unable to quickly respond

to the release provided by density management thinning and partial cutting management prescriptions may no longer be a forest management option.

The capability of the ecosystem to restore the Jumpoff Joe watershed vegetation to natural conditions, as we understand them, using natural processes would be through fire, insect, disease or other types of disturbance events that create growing space. These processes would lower densities and clear out competing understory vegetation.

Fire is the primary process that would lower densities and clear out competing understory vegetation. In the absence of fire, insects and disease often become the processes that reduce stand density. Because of densities in the forest stands (live fuels) in the Jumpoff Joe watershed, the buildup of dead and down fuels, the checkerboard ownership of private and government lands and the rural residential interface, it is impossible to allow the natural fire regime to control forest densities at this time. At the present time, a naturally occurring fire, such as caused by lightning, would have a high potential to be intense stand replacement fires and threaten human lives and property.

G. Human Use

Significant changes that have occurred in the watershed include: More roads throughout the area, some of which were constructed because of BLM timber sales to access and manage BLM lands. Many other roads were constructed on private land to access and develop properties. More people are living in the area because of the increase in population in southern Oregon as well as people's desires to move out of the city into a rural area. With this increase in population and access, comes an increased use of public lands. The type of recreational use is also changing from non-motorized to motorized (before roads, there were mainly trails which accessed the area). In the past 10 years, there has been less federal timber cutting and more private timber cutting. The demand for timber has been on the private lands, due to federal injunctions, ecosystem management and the high monetary value of timber. Due to the increase in population and access, as well as an increase in landfill fees, there has been an increase in the illegal use of the watershed from dumping to living on BLM land to firewood cutting and collection.

Settlement patterns have historically centered around mining towns. Mining was located primarily in the east half of the watershed along Jumpoff Joe and Louse Creeks (the towns of Mountain, Winona and Granite Hill). Settlement patterns shifted westward in the watershed with the railroad passing through the area in 1883 (Hill 1976). This westward shift of settlement also followed the roads in the west half of the watershed, including Highway 99 and, later, Interstate 5, which was built in the early 1960's as a major north-south route through western Oregon. Current settlement patterns are centered around these roads and towns. Towns in the watershed include Merlin and Hugo located along the railroad route.

The anticipated result of these social or demographic changes/trends that could have ecosystem management implications include an increase in population which increases the demand for use (or abuse) of public lands, a continuation of the illegal use of the watershed due to lack of law enforcement patrol, and landfill fee increases.

H. Fire Management

A major difference between existing and reference condition is the change in the fire regime. The watershed has gone from a low-severity to a high-severity fire regime. Previously, fire has occurred frequently and burned with low intensity, and functioned largely in maintaining the existing vegetation. Currently, fire is infrequent, burns with high intensity, and causes high degrees of mortality, replacing vegetation rather then maintaining it. This has resulted from nearly a century of fire suppression and exclusion. The change in vegetation conditions, fuel profile and amount of fuel present is now such that the impacts from a large wildfire will produce severe effects on vegetation, erosion, habitat and water quality. Stand replacement from wildfire impact was a low percentage in the reference condition. Existing conditions will produce 50 to 75% stand replacement today. The Walker Mountain Fire in 1988 is an example of the effect that can be expected at this time and in the future. The current trend is for increasing fuel hazard buildup and increasing risk for fire ignition due to population growth and human use within the watershed and adjacent region.

The magnitude of this change is widespread throughout the entire watershed. Only 6% of the watershed is currently in a low hazard condition. High hazard conditions occur throughout the watershed and cover nearly 50% of the area. Vegetation in the watershed is at a high degree of risk for mortality and stand replacement from wildfire. The existing and future trend in fuel and vegetation conditions is the predominant factor that will adversely effect the ability to achieve most management objectives for the watershed. The capability of the watershed to achieve and meet management objectives is low in the long term (20 years plus).

I. Species and Habitats

1. Special Status Plants

Differences between current and reference special status plant habitat conditions have occurred primarily from fragmentation of habitat due to development or timber harvest and changes in species composition due to fire suppression. Fragmentation of the late-successional habitat required by the three S&M vascular plant species lends uncertainty to the long-term health of these species. As habitat continues to shrink, those populations in existence will become more isolated with little chance of expansion. This will also make them more susceptible to extirpation from chance events (such as a hot burning wildfire) that could cause major perturbations in numbers of individuals per population and numbers of populations in the region (*i.e.*, southwestern Oregon). As the numbers of individuals decrease, the number of populations decrease and their habitat is reduced, the chance of

extirpation of these three species from this region could occur.

The reason these species were determined to be S&M was because their future viability was uncertain due to their dependence on late-successional forest habitat. Late-Successional Reserves designated by the Northwest Forest Plan do not provide refuge for the majority of populations of these species in this region of Oregon. The majority exist on matrix lands. Appendix J2 of the FSEIS discusses the need to not only protect known sites of these species, but recommends retaining canopy closures of 60% or greater and protecting mychorrhizal connections. By taking an ecosystem management approach in this watershed, it could ensure that a natural range of ecosystem variability is retained which would include this late-successional habitat. BLM policy as stated in the Medford District Resource Management Plan also includes the objective of "studying, maintaining or restoring community structure, species composition and ecological processes of special status plants." These guidelines/objectives need to be considered with the same weight as timber objectives.

Fragmentation of native valley habitats due to development have left BLM lands as the only areas left relatively untouched, but also unmanaged. This mixture of grasslands, oak woodlands and *schlerophyllous* shrubland provides a unique biodiversity that has disappeared in not only this watershed, but others draining into the Rogue Valley. Due to lack of a natural fire regime these habitats will continue to lose biodiversity without an active management strategy. Grasslands are becoming overrun by noxious weeds, oak woodlands are becoming invaded by conifer species and shrublands are closing their canopies completely as succession remains unchecked by fire. The areas in the watershed where native valley habitats still occur on BLM land are along Jumpoff Joe Creek, northeast of Merlin (near Interstate 5) and along Louse Creek (only a small portion of which is under federal ownership).

The Medford District RMP includes management actions/directions that require the maintenance or enhancement of habitats such as these. Any treatment to these areas must consider the habitat requirements of the native species depending on them.

Differences in current and reference serpentine habitat conditions are mostly due to fire exclusion, but some residential development is also occurring along the lower flanks of Red Mountain and Sexton Mountain. The Medford District RMP also includes management actions/directions that require the maintenance or enhancement of special habitats such as serpentine.

2. Aquatic Species

a. Stream and Riparian Trends - Private (Non-Federal) and Federal Lands

The future trend in aquatic habitat conditions in the Jumpoff Joe watershed will be influenced by three major limiting factors:

(1) Successional stage of vegetation in riparian zones;

(2) the amount of stream flow between early summer and fall;

(3) the rate and magnitude of sediment delivery.

The expected fish habitat trend in the watershed will vary with land ownership.

b. Riparian Reserves and Coarse Woody Material

Streamside shade and coarse woody material on federal lands will increase. It will take approximately 150-300 years without active riparian management for streamside areas on federal land to attain late- successional characteristics. Active riparian management in many instances will produce large trees faster. Large mature trees will contribute to fish habitat complexity after falling into the stream.

Age and structural diversity of vegetation in riparian areas on federal land may increase in response to BLM and USFS actions that meet Aquatic Conservation Strategy (ACS) objectives. There is no intent to change riparian widths in the Jumpoff Joe watershed but to protect and actively manage the riparian areas.

Quality of stream and riparian habitat on private land will decrease as timber harvest proceeds in unentered or lightly harvested timber stands. Revised State Forest Practice Rules probably will not maintain or reduce stream temperatures because they allow timber harvest as close as 100 feet from fish-bearing streams. There are no setback or shade requirements on Class 3 and 4 streams on non-federal land. A 75-foot no-cut riparian buffer strip is necessary in some cases to maintain or lower water temperatures. In addition, largest diameter conifers often with the fullest canopy and best potential for shading and between 20 and 75 feet from streams could be cut when they reach commercial size.

The amount of coarse woody material in the riparian area on private land will diminish due to natural processes or timber harvest. It will not be replaced to any appreciable degree because largest conifers in riparian transition zones will be logged when they reach commercial size.

Roads on private woodlands and on private commercial forestland are primarily natural surface with inadequate drainage. Tractor yarding will continue to be the most frequently used yarding method, even on steep slopes. Water bars will often be ineffective. This will cause excessive siltation in the streams and smother salmon eggs and reduce fish survival.

3. Instream - Large Woody Debris

The greatest potential for improvement in complexity of fish habitat on a small watershed scale (smaller than a subwatershed) over the long term will be on federal lands. All streams on federal land will become more effective at dissipating stream flow energy; scouring pools, providing complex habitat for fish, amphibians and invertebrates; and will be more retentive of organic detritus.

Boulders and rubble, rather than large wood, play a major role in creating fish habitat in larger streams (*i.e.*, >3rd order). However large woody debris continues to be important in the steeper Class 3 and 4 streams by dissipating stream energy (*i.e.*, forming a stepped channel profile), controlling the movement of sediment and small organic matter and providing habitat for fish and amphibians.

Riparian condition as well as contribution of large woody debris to streams will improve on federal land as the BLM and USFS implement projects under (ACS) objectives, including projects to reduce sediment sources.

Class 3 and 4 streams on forested private land may become less capable of controlling movement of sediment and fine organic material and providing habitat for amphibians because of the lack of amount of large woody debris will decrease over time. Riparian transition zones will remain in early and mid-successional stages on non-federal lands.

4. Sedimentation

Stream sedimentation is expected to decrease in Class 3 and 4 streams on federal lands with the ACS and Best Management Plans (BMPs) in all watershed restoration activities. Assuming new activities will not contribute to existing sedimentation problems. However, there may not be an appreciable change in the amount of sediment deposition in Class 1 and 2 streams if road construction standards and tractor logging practices do not substantially improve on non-federal lands.

Many roads and tractor skid roads on private lands do not receive regular maintenance, nor were most of them designed with adequate drainage or erosion control features. Sediment from these areas can be expected to adversely impact streams on public and other non-federal lands downstream.

5. Stream Flow

Stream flows on federal lands during dry seasons are expected to increase in the future as a result of the NFP standards and guidelines and BMPs.

Intensity and frequency of peak flows, if they have occurred as a result of management activities, will diminish as vegetation re-grows in previously harvested areas and as road mileage is reduced to meet objectives of the ACS.

Potential indirect adverse effects of altered peak flows on salmonid reproduction would diminish. This assumes that timber harvest on private land will continue at no greater than the present rate and that new road construction on private land will not offset efforts to reduce road mileage on public lands.

Irrigation water diversions on private lands will continue to limit quality and quantity of habitat for fish and other aquatic species and kill fish. Diversions will continue to compound problems caused by drought by limiting the quality and quantity of habitat for aquatic life.

Diversions from streams for irrigation and mining purposes combined with century old water rights have significantly decreased the amount of water available to fish, especially during low-flow periods. Changes in the landscape are caused from agriculture (water diversions), roads and timber harvest. Irrigation withdrawals primarily exacerbated the adverse effects of poor land management and continue to force a decline in the anadromous fishery.

Sand and gravel operations typically redirect and pond water from streams. This action diverts adult and juvenile fish away from productive stream habitats. Warm water fish typically inhabit the warm ponds and prey upon juvenile salmonids.

6. Stream Temperature

Stream temperature should decrease with implementation of the ACS and BMPs.

Water temperatures will increase in Class 1-3 streams on private lands. Water temperatures in the lower portions of Jumpoff Joe Creek are expected to remain above optimum for salmonids, some amphibians and aquatic macroinvertebrates, regardless of the water year because stream flows are over-appropriated with water rights.

7. Aquatic Species

Factors outside the watershed that will continue to influence return of anadromous fish to the watershed include ocean productivity, recreational and commercial harvest, predation in the Applegate and Rogue Rivers and the ocean, habitat changes due to human developments in floodplains, and migration and rearing conditions in the Applegate and Rogue Rivers. Equal effort must be given to correcting human-related factors that limit fish survival in freshwater and marine environments. Habitat for Pacific lamprey in the middle and lower river is expected to remain stable to moderate condition.

Jumpoff Joe Creek coho salmon are listed as a federally-threatened species and steelhead have been petitioned for threatened and endangered species status. Implementation of the ACS on public land will improve watershed health. However, potential for recovery of anadromous fish habitat is only poor because the majority

of the watershed is in non-federal ownership.

Fewer sediment and temperature tolerant aquatic insect taxa will be present in Class 3 and 4 streams as watershed conditions improve. Collector-dominated communities in these small streams would gradually shift to scrapers and shredders as canopy closure and the conifer component increases. Composition of aquatic macroinvertebrate communities in the river and in most other fish habitat will probably remain much as it is. Collectors, scrapers and shredders feed on vegetative material while predators feed upon these.

Current resource management practices and water diversions on private lands, which are beyond the scope of the ACS, will continue to limit potential for recovery of salmon and steelhead habitat and populations. The ACS must be applied equally across all ownerships to achieve potential for recovery of at-risk fish stocks. In addition, innovative ways must be found to fully restore natural flows to the river during summer.

Private lands which contain most of the fish habitat in the watershed will probably continue to be managed intensively for wood production and livestock pasture. The cumulative effects of management activities have substantially altered the timing and quantity of erosion and have changed instream channels, all which have impacted fish production. Streams and riparian areas with federal ownership are in much better

condition than streams on private lands. During low-flow periods, water flows off federal lands and in some areas is totally withdrawn for irrigation, leaving the streambed dry.

J. Wildlife

1. Species

The conservation of native biodiversity by the federal government is limited by a number of factors including: the availability of species to repopulate habitat, land ownership, spatial relationship of the federally-controlled land and habitat quantity and quality.

The extirpation of native wildlife from an area alters how the remainder of the community functions. Native species play roles that benefit the community as a whole. Removal of one species may lead to a population imbalance in another. Historically, wolves and grizzly bears served as a predators in the watershed. The act of predation played a critical role in the community. Prey remains not consumed by the wolf were available to a host of other animals. Deer and elk populations were kept in balance with the vegetation, and the community as a whole benefitted from the predation. When exotic species are introduced into a community the food chain is set out of balance. Historically, the watershed did not contain largemouth bass (*Micropterus salmoides*). The introduction of this species has had deleterious effects on turtles, frogs, and ducks.

Species known to be extirpated from the watershed include grizzly bear and wolf. Wolves have remained on the sensitive species list due to sightings of large canids within southwestern Oregon. Currently Oregon is not included in the recovery plans for these two species. Species such as the wolverine that have remnant populations in the province may have the ability to recover themselves in this watershed, but due to the checkerboard ownership, the federal government has limited options to promote the remote habitat these species require.

Habitat quantity and quality is a critical factor determining the absence or presence of species in the watershed. Species with narrow habitat requirement such as late-successional dependent species will not maintain populations in areas void of older forest. The following Table V-1 displays the expected habitat trend for species of concern in the Jumpoff Joe watershed. The majority of the watershed is classified as matrix land. It can be expected that this land will continue to be harvested for timber. The NFP requires that a minimum of 16-25 large leave trees (+21") per acre be left in all harvested units, which will result in the long run (50+ years) in a multi-age, multi-canopied forest. In the short run it is expected that mature trees will be harvested resulting in a decline of older forest in the watershed. Specific actions such as commercial thinning may possibly hasten the development of older forest in the watershed, which would be beneficial for the majority of the species of concern.

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common Name	Habitat	Expected Habitat Trend
Grey Wolf	Generalist, prefers remote tracts of land	Decrease in the watershed
White-footed Vole	Riparian alder/small streams	Increase in habitat as riparian areas recovers from past disturbance
Red Tree Vole	Mature conifer forest	Decrease in the watershed
California Red Tree Vole	Mature conifer forest	Decrease in the watershed
Fisher	Mature conifer forest	Decrease in the watershed
California Wolverine	Remote/high elevation forest	Decrease in the watershed
American Marten	Mature conifer forest	Decrease in the watershed
Ringtail	Rocky bluffs, caves and mines	Possible decrease in habitat as hard rock mines/quarries reopen
Peregrine Falcon	Remote rock bluffs	No nesting habitat available
Bald Eagle	Riparian/mature conifer forest	Possible increase as riparian areas recover from past disturbance, decrease on matrix lands
Northern Spotted Owl	Mature conifer forest	Decrease in the watershed
Marbled Murrelet	Mature conifer forest	Decrease in the watershed

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common Name	Habitat	Expected Habitat Trend
Northern Goshawk	Mature conifer forest	Decrease in the watershed
Mountain Quail	Generalist	Stable
Pileated Woodpecker	Mature conifer forest/snags	Decrease in the watershed
Lewis' Woodpecker	Oak woodlands	Decrease until management strategy developed for oak woodlands
White-headed Woodpecker	High elevation mature conifer forest	Decrease in the watershed
Flammulated Owl	Mature Ponderosa pine/mature Douglas-fir forest	Decrease in the watershed
Purple Martin	Forage in open areas near water/cavity nesters	Increase as riparian areas recover and forest mature
Great Grey Owl	Mature forest for nesting / meadows & open ground for foraging	Increase in foraging habitat, decrease in nesting habitat
Western Bluebird	Meadows/open areas	Decrease as clearcuts recover and meadows become encroached with trees
Acorn Woodpecker	Oak woodlands	Decrease until management strategy developed
Tricolored Blackbird	Riparian habitat/cattails	Stable/increase as riparian habitat recovers
Black-backed Woodpecker	High elevation mature conifer forest	Decrease in the watershed
Northern Pygmy Owl	Conifer forest/snags	Decrease in the watershed
Grasshopper Sparrow	Open savannah	Decrease until management strategy developed for savannah habitat
Bank Swallow	Riparian	Increase as riparian habitat recovers
Townsend's Big-eared Bat	Mine adit/caves	Decrease as trees around caves/adits harvested
Fringed Myotis	Rock crevices/snags	Decrease in the watershed
Silver-haired Bat	Conifer forest	Decrease in the watershed
Yuma Myotis	Large trees/snags	Decrease in the watershed
Long-eared Myotis	Large trees/snags	Decrease in the watershed
Hairy-winged Myotis	Large trees/snags	Decrease in the watershed
Pacific Pallid Bat	Large trees/snags/rock crevices	Decrease in the watershed

Table V-1: Expected Federal Habitat Trends for Species of Concern

Common Name	Habitat	Expected Habitat Trend
Western Pond Turtle	Riparian/uplands	Increase as riparian habitat recovers
Del Norte Salamander	Mature forest/talus slopes	Decrease in the watershed
Foothills Yellow-legged Frog	Riparian/permanent flowing streams	Increase as riparian habitat recovers
Red-legged Frog	Riparian/slow backwaters	Increase as riparian habitat recovers
Clouded Salamander	Mature forest/snags/down logs	Decrease in the watershed
Southern Torrent Salamander (Variegated Salamander)	Riparian/cold permanent seeps/streams	Increase as riparian habitat recovers
Black Salamander	Talus/down logs	Decrease in the watershed
Sharptail Snake	Valley bottom	Stable
Calif. Mtn. Kingsnake	Generalist	Stable
Common Kingsnake	Generalist	Stable
Northern Sagebrush Lizard	Open brush stands	Stable
Tailed Frog	Riparian/mature forest	Increase as riparian habitat recovers

2. Dominant Processes from Historic Condition to Current Conditions

The settlement of the watershed and the subsequent division of land between the public and private ownership has limited the ability of the federal agencies to restore historic conditions in the watershed. Currently, the checkerboard ownership pattern of the federally-managed land, and the fragmentation and patch size of the remaining late-successional habitat will partially determine the ability of the watershed to support many species of concern. This is particularly true for species with low dispersal capabilities such as the Del Norte salamander. In addition, the limited federal control of some plant communities inhibits the recovery of species of concern without the cooperation of private landowners. This is particularly true for native grasslands, oak savannahs and anadromous fish bearing streams (riparian habitat). In addition, the suppression of fire within the watershed has changed vegetation patterns and historic habitat distribution. Species dependent on fire created habitats have been negatively impacted. Older forests have also been affected by timber harvest. Species associated with this habitat type have been negatively impacted through the conversion of older stands to younger stands. Species utilizing early seral habitat and edges on the other hand have benefitted from this shift of older forest to younger forest. Timber harvest and road building has also led to increased sedimentation, increased stream temperatures, and decreased stream stability and structural diversity. Road building also negatively decreases the effectiveness

of a number of habitats due to disturbance, and has further fragmented patches of late-successional forest.

Trend for habitats found on federally-administered public lands are determined by the NFP. Broadly speaking, the Jumpoff Joe watershed is composed of matrix land, riparian reserves and eight 100-acre spotted owl cores that function as late-successional reserves. The majority of the timber extraction will occur on this land, with an overall trend towards younger forest with some old-growth components. Expected trend for the 100-acre cores is maintenance of late-successional conditions. The success of the reestablishment of population of old-growth species will depend on the species dispersal capabilities, habitat condition of the matrix land and ownership pattern.

Potential limiting factors for recovery of habitats of sensitive species includes fire suppression, the amount of old-growth forest and habitat fragmentation. Historically many habitats within the watershed were created and maintained by disturbance events, in particular fire. Fire for the most part has been excluded from the watershed for the last 80 years. Fire-created habitats and associated wildlife species have been negatively impacted from fire exclusion. This is particularly true for oak/savannah and pine stands. Currently, timber harvest is the dominant disturbance found in the watershed.

Habitat fragmentation occurs both on the valley floor as well as the uplands. Habitats found along the valley floor have experienced severe fragmentation due to conversion to home sites. Due to habitat fragmentation, patch size, and access for wildlife, many sites no longer function to their biological potential. Of particular concern is the remaining oak woodlands and Ponderosa pine sites. The loss of these habitat types will continue to contribute to the decline of associated species of wildlife. Tracts of public land are critical in ensuring that this habitat type and the biodiversity it supports remain represented in the valley.

The amount of old-growth forest historically found in the watershed was never stable and continually fluctuated through time. Forests are constantly developing towards their climax community, while simultaneously being set back to earlier seral stages by disturbances. Historically, when large scale disturbances moved through the watershed the amount of old growth would be low. As time passed, the old-growth habitat would recover, allowing species associated with this habitat to recolonize into the watershed. Colonization was aided by the higher population level of old-growth dependent species as well as the greater amount of mature and old-growth forest historically present in the region. This larger amount of old-growth forest allowed for greater connectivity of habitat and easier dispersal of species associated with this habitat. Currently, the amount of fragmentation of old-growth habitat in the watershed is of particular concern. Due to the checkerboard ownership pattern and past timber harvesting, the remaining mature and old-growth habitats are widely fragmented. Species dependent on older forest such as the American marten (*Martes americana*), the Fisher (*Martes pennanti*) and the northern spotted owl (*Strix occidentalis*) have limited habitat in the watershed. Many of the remaining older stands no longer serve as habitat for late-successional dependent species due to the amount of edge the stands contain which is increased by irregular shapes and small sizes. The edge to interior ratio effects how useful the stand is

for late-successional species. Stands with a great deal of edge no longer function as interior forest. The micro-climatic changes of the "edge effect" can be measured up to three tree lengths in the interior of the stand (Chen 1991).

Isolated patches of old-growth habitat may be too small to support the maximum diversity of species. In heavily-fragmented environments, larger predators that naturally occur at low densities are lost first (Harris and Gallagher 1989). The California wolverine (*Gulo gulo luteus*) utilizes high elevation undisturbed habitat and their population is now of concern due to fragmentation. Fragmented habitat leads to isolated populations of animals which lose genetic vigor, and is a serious threat to biological diversity (Wilcox and Murphy 1985). Intact old-growth corridors are critical for ensuring gene pool flow, natural reintroduction and successful pioneering of species into unoccupied habitat. Animals disperse across the landscape for a number of reasons including food, cover, mates, refuge, and to locate unoccupied territories. The vast majority of animals must move during some stage of the life cycle (Harris and Gallagher 1989). Dispersal corridors function when they provide hiding and resting cover. Species that depend on late-successional forest are poor dispersers and more vulnerable to extinction in fragmented landscapes than species associated with early-successional stages (Noss 1992). This is particularly true for flightless species such as the Fisher (*Martes pennanti*). Fishers are reluctant to travel through areas lacking overhead cover (Maser *et al*. 1981) and are at risk for genetic isolation. Species that are more mobile, such as the spotted owl, may be capable of dispersing into isolated patches of habitat but run a higher risk of predation when crossing areas of unsuitable habitat.

Small patches of old-growth forest can provide important refugia for poor dispersers and species with small home ranges such as the Del Norte salamander (*Plethodon elongatus*), allowing for recolonization into surrounding areas if future conditions become more suitable. Isolated patches of old growth also offer important refugia for a number of late-successional associated bryophytes, lichens, fungi and other plants.

The high density of roads in the watershed are of concern due to their effects on habitats. The construction of roads contributes to the delivery of sediment into the aquatic system. Road building along streams has also led to increased channelization of the stream. Sediments can negatively effect fish by filling pools, embedding spawning gravel and smothering eggs. Roads also lead to increased disturbance, such as poaching and decrease habitat effectiveness. Increased disturbance to deer and elk increase their metabolic rate and decrease their reproductive success (Brown 1985). Roads also further fragment patches of old-growth forests' creating "edge" which changes interior forest conditions and allows generalist species to compete with old-growth dependent species. Species such as the great horned owl (*Bufo virginianus*) utilize fragmented landscapes, and prey on spotted owls.

3. Expected Habitat Trends

The habitat trends for species of concern varies with ownership and plant community. In general habitats found

on private lands have undergone the most significant change from historic conditions. Public lands management by the federal government have undergone less dramatic change but are notably different from conditions found in pre-settlement times. Expected trends on private lands are nearly impossible to gauge, but there is a tendency for short-term rotation on forestlands (60-80 years), and heavy use of most native grasslands, riparian, and oak woodlands for agriculture and home sites. Native plant communities such as grasslands, pine stands, oak savannahs, and old-growth forest, and their associated animal communities should be considered at risk on private lands. Expected habitat trend for each plant community can be found in the following narrative.

a. Riparian

The condition of the riparian habitat is dramatically different from pre-settlement conditions. Timber harvest, road building, water withdraw and urbanization has led to poor functioning stream system. Recovery of the aquatic biodiversity on public land is partially limited due to the condition of private land in the watershed, particular in regards to salmonids. The majority of low gradient stream habitat found in the watershed is under private ownership. These areas historically contained the best spawning habitat for fish. Expected trends for these areas is to remain static or decrease due to increased human population and demand on resources. Quality of riparian habitat on federally-administered land should increase under the new forest plans. Cooperative agreements of all parties within the watershed would be necessary to ensure continued viable population of fish and wildlife.

b. Pine Habitat

Maps produced in 1856-1894 by the General Land Office characterize much of the valley floor as being dominated by oak and pine. Many of these stands have been lost on private land through timber harvest and conversion to home sites and agriculture. The majority of pine stands on public land have seen some form of timber management, other stands have been allowed to degrade due to fire exclusion and encroachment of fire intolerant species. The expected trend for private land is for continued harvesting of this habitat on a short-term rotation bases. Pine habitat found on matrix land will continue to be available for timber harvest. Pine habitat found on withdrawn land will continue to degrade in quality until such time that a management strategy has been developed.

c. Oak Woodlands

Oak woodlands within the watershed are disappearing faster then they are regenerating themselves. The precise amount of this habitat type historically found in the watershed is unknown, but current quantity of this habitat are thought to be a fraction of what historically occurred. Expected trends on private lands for oak woodlands is to remain static or decline. The majority of federally-controlled oak woodland are found on land withdrawn from the timber base, and largely remain unmanaged. Natural disturbance such as fire has been reduced, and many of these stands are in poor condition. Expected trend is for further habitat degradation until these problems can be addressed with a management strategy.

d. Old-Growth Forest

Little if any private old-growth forest remains in this watershed. Due to short rotation between timber harvests on private forestland there is not expected to be an increase in old-growth forest on private land. Quantity and quality of old-growth forest located on federally-administered old-growth forest located in the matrix land is expected to decrease under the forest plan.

VI. Management Recommendations

A. Purpose

The purpose of recommendations section is to bring the results of the previous steps to conclusion by focusing on management recommendations that are responsive to watershed processes identified in the analysis. Recommendations also document logic flow through the analysis, linking issues and key questions from step 2 with the step 5 interpretation of ecosystem understandings. Recommendations also identify monitoring and research activities that are responsive to the issues and key questions and identify data gaps and limitations of the analysis (Federal Guide for Watershed Analysis, Version 2.2, 1995.)

B. Recommendations

The following tables (VI-1 through VI-4) list recommended management actions that will lead towards the desired future condition of the Jumpoff Joe watershed.

C. Data Gaps

Data gaps are listed in Table VI-5. Data gaps are also carried through as recommendations.

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Special Status Survey & Manage Plants	Species and Habitat (Botany)	Watershed Wide	Survey entire watershed for sensitive plants, protect known sites during ground disturbing activities with a minimum of 100 feet radius buffers, using an ecosystem management approach, institute management strategies to maintain/improve sensitive species habitat.
All	Ponds	Species and Habitat (Wildlife)	Watershed Wide	Three sites are known, and whenever possible should be improved to enhance their value to wildlife.
All	Deer Winter Range	Species and Habitat (Wildlife)	Areas Located Below 2,000 Feet	Seasonal closure of roads to prevent disturbance, reduce road densities by decommissioning roads, minimize new permanent road construction, restrict management activities between November 15 to April 1.
All	Location of Springs/Seeps	Hydrology	Watershed Wide	Inventory the watershed to locate springs/seeps.

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Inventory	Hydrology, Stream Channel	Watershed Wide	Inventory and classify all streams. Inventory all stream riparian areas for proper functioning condition.
All	Road Density	Erosion Processes	Upper Louse Creek, Quartz Creek, and Jack Creek	These areas should receive high priority for any proposed actions that reduce road density because of extremely high road densities and the occurrence of highly- erodible granitic soils.
All	Private Land	Species and Habitat (Botany, Aquatic), Vegetation	Private Land	Work with non-federal landowners, help them identify and protect sensitive plants and their habitats. Work with private landowners to restore riparian and fish habitat and modify irrigation diversions that jeopardize juvenile fish passage. Accomplish this through working with watershed councils, partnerships, etc.
All	Serpentine Habitat	Species and Habitat (Botany), Vegetation	Serpentine Sites	Institute a prescribed fire of low intensity to reduce herbaceous layer buildup and shrubs/trees encroachment, ensure ground disturbing activities such as mining and OHV use are kept to a minimum. Based on the 1996 plant series maps, begin restoration of the Jeffrey pine sites.
All	Meadows, Oak Groves, Shrublands, Ponderosa pine Sites	Species and Habitat (Botany, Wildlife), Vegetation	Watershed Wide (See Appendix D for locations)	Locate, survey and map areas identified in the appendix and track development on non-federal lands. Protect and restore areas on federal lands by instituting a program of prescribed burning and mechanical treatments (thinning, brushing) to reduce density of early seral vegetation, slow encroachment and increase diversity. Based on the 1920 plant series maps, begin restoration (thinning, brushing and burning) of the Ponderosa pine and Oregon white oak.
All	Noxious Weeds	Species and Habitat (Botany), Vegetation	Watershed Wide	Develop an active eradication program for noxious weeds in the watershed, especially in the native grasslands adjacent to agricultural and developed areas.

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All (needs work)	Monitoring	All	Watershed Wide	Monitoring as a standard aspect of projects. Specifically, monitor relative abundance and distribution of exotic fish species, classify all streams, conduct benthic macroinvertebrate surveys at 5-10 year intervals, survey fish habitat at 10-15 year intervals, inspect all culverts, monitor effectiveness of fish structures, annual population studies of cutthroat trout. Monitor soil erosion rates. Field survey for mass movement features in areas mapped with high susceptibility, also field survey for areas with streambank erosion features. Monitor relative abundance and distribution of special status species. Monitor growth of young (less than 50 years) stands to see how they compare to computer models predicting growth.
All	Road Closures	Fire	Watershed Wide	Utilize gate closures during periods of very high to extreme fire danger.
All	High-Intensity Fire Occurrence	Fire, Erosion Processes, Wildlife	Watershed Wide	Consider Fuel Modification Zones (FMZ) on ridgetops throughout the watershed. A connected system of these ridgetop zones would create opportunities to compartmentalize wildfires into small drainages and prevent large scale wildfire occurrence. Reduce the risk of a high-intensity fire occurrence and return to a condition that will produce a low-intensity fire regime

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Road Access	Fire, Human Uses	Watershed Wide	Maintain and enhance strategic road access for wildfire suppression forces. Access will be critical in the short term to prevent large fire occurrence. This is especially important where we have high value forest stands or other high values at risk. Decreases in roads should not occur until hazard reduction and maintenance plans are in place. Additionally, human safety during fire suppression needs to be considered. It is especially important to not create dead-end road systems in drainages which currently have road systems that connect out into other drainages. These are important escape routes and may influence the decision to fight fire in a drainage or let it go.
All	Helispots	Fire	Watershed Wide	Create helispots and pump chances as opportunities and need is identified.
All	Dispersed Recreational Use	Human Uses	Watershed Wide	Conduct Recreation Opportunity Spectrum Inventory on BLM lands within the watershed to determine amount, type of use. Use this information to provide recreation sites where needed, and manage levels of use criteria where it will decrease adverse impacts created by current use *(i.e.* erosion, sedimentation, denuded vegetation in riparian areas, introduction of exotic species).
All	Cultural Resources	Human Uses	Watershed Wide	It is recommended that a field survey of the lands within the watershed be completed where possible. This would serve to update inventories of the watershed and perhaps reveal historic / prehistoric sites that have not yet been identified.
All	Off-Highway Vehicle Use	Human Uses	Quartz Creek OHV Area	Conduct management plan in the 7,120 acre Quartz Creek OHV area to determine impacts, use and provide management recommendations. Include fire management plan in OHV management plan.
All	Sociological Information	Human Uses	Watershed Wide	Conduct study to acquire sociological information for the watershed, and incorporate that information into the watershed analysis.

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Road Density	Erosion processes, Human Use, Water Quality	Watershed Wide	Complete road density studies for HUC7 watersheds. Establish TMOs for BLM roads, prioritize and set goals for road density reductions. Decommission or upgrade (i.e. improve drainage) roads as necessary to reduce sedimentation and high peak flows. Highest priorities for road treatments are roads contributing large amounts of sediment to streams, and roads in riparian reserves, unstable areas and midslopes. Identify roads for decommissioning from the Transportation Management Plan.
All	Illegal Use of Watershed	Human Uses	Watershed Wide	Minimize the amount of illegal human use of the watershed (dumping, firewood cutting, occupancy) by enforcing rules and regulations, increasing visible presence in the area and educating the public about protection of resources. Cleanup and close dump sites. Close any dead-end natural surface road and consider gating or blocking the following roads: Morris Creek (35-5-21.1), 34-7-25 road off Quartz Creek and Walker Mountain Road (35-5-9) to reduce illegal dumping.
All	BLM Capitalized Roads	Human Uses	Watershed Wide	Update road inventory as new information is collected on road drainage, road grade, surface depth, road condition and barricades.
All	BLM Non-Capitalized Roads and Skid Trails	Human Uses	Watershed Wide	Develop an inventory process for BLM non-capitalized roads and skid trails.
All	Non-BLM Roads and Skid trails	Human Uses	Watershed Wide	Develop a minimum inventory process for non-BLM roads/skid trails. Consider requesting the permission of private landowners if more detailed information is needed.
All	Public Outreach	All	Watershed Wide	Provide public outreach to inform residents of the need for and the feasibility of implementing watershed projects.
All	Soil Erosion Rates	Erosion Processes	Entire Watershed	Reduce the soil erosion rates on Siskiyou soil series by limiting the ground disturbing activities and testing innovative ways of accomplishing this goal.

Table VI-1: Recommendations for All Land Allocations

Land Allocation	Issue/ Concern	Related Core Topic	Location	Recommendation
All	Soil Productivity	Erosion Processes	Entire Watershed	Conduct soil nutrient capital inventories

Table VI-2: Recommendations for Matrix Land

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Matrix	Matrix	Species and Habitat (Wildlife)	Mapped Locations	When planning projects, conduct forest management activities in a manner that mimics natural disturbance, maintains species and structural diversity. Minimize timber harvest in all mature and old-growth habitat, minimize road building, focus timber harvest on large pole stands. Maintain and increase connectivity of older stands.
Matrix	Old-Growth habitat	Species and Habitat (Wildlife, Botany)	Mapped Locations (McKelvey 1)	Maintain all mature and old-growth habitat, promote stand size (acres) and connectivity by manipulating adjacent stands to achieve old-growth conditions.
Matrix	Sawdust Pile/Leachates into Stream	Species and Habitat (Aquatic)	Upper Jumpoff Joe Creek	Remove sawdust pile and reroute the stream to its original channel on the far side of the sawdust pile, fill in the old streambed and construct a road to the sawdust pile.
Matrix	Hazard Reduction	Fire, Vegetation	Watershed Wide	Accomplish hazard reduction treatments (thinning, brushing, and burning) along BLM property lines at low elevations where high risk exists. First priority is in the Rural Interface Areas. This will create defensible zones where wildfire spread would be slow and allow fire suppression forces time to respond and contain fires at small sizes.
Matrix	Hazard Reduction	Fire	Watershed Wide	Accomplish hazard reduction treatments along midslope and ridgetop road systems on BLM lands. This would create defensible zones and opportunities for suppression forces to contain fires and potentially prevent ridgetop to valley floor fire occurrence.
Matrix	Quarries	Human Uses	Watershed Wide	Complete field surveys for condition of quarries and design restoration strategy.

Table VI-2: Recommendations for Matrix Land

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Matrix	Inventory	Vegetation	Watershed Wide	Inventory the watershed (stand exams, stocking surveys, classification into plant associations) on an Operations Inventory (OI) unit basis. Update OI as data is collected.
Matrix	Young Stand Management	Vegetation	Watershed Wide	Forest management activities will emphasize young stand management as a priority (less than 50 years). Embark on a young stand management plan (brushing, precommercial thinning, handpiling and burning the resulting slash) of not just old clearcuts but natural stands. Priorities for management should be on-site quality not whether or not the area has been clearcut. The best sites get the first treatment(s). "Link" treatments; projects should not be seen as single events, but rather a sequence over time culminating in desired future condition. Example: stand initiation (new age class) to initial canopy closure of the desired number of trees by species per acre. This would incorporate multiple treatments over a 10 to 20 year project window and enhance planning/budgeting efforts.

Table VI-3: Recommendations for Special Areas

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Special Areas	Spotted Owl Cores	Species and Habitat (Wildlife)	Provincial Home Range of Known Sites	Increase amount of McKelvy 1 & 2 within provincial home range to standards developed by the USFWS (1,388 acres within 1.3 miles of spotted owl cores as of Jan 1, 1994).
Special Areas	High Value Stands	Fire	Watershed Wide	Identify stands and other features of high resource value that are at risk (owl cores, old growth, special areas) and treat hazard within or adjacent to these stands. Objective would be to preserve these in the short term from loss to wildfire.

Table VI-4: Recommendations for Riparian Reserves

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Riparian Reserves	Streams	Species and Habitat (Aquatic), Vegetation, Stream Channel	Watershed Wide	Provide adequate shading, depth, and current to keep temperature below 58EF, restore stream complexity, streambank and bottom integrity, maintain and restore juvenile salmonid rearing areas, and adult spawning areas, retain gravel and sediment, nutrient and wood routing. Begin extensive riparian restoration primarily through thinning, brushing, and burning to restore degraded aquatic ecosystems. Stabilize eroding stream- banks. Reduce width-to-depth ratios where appropriate (Lower Jumpoff Joe Creek).
Riparian Reserves	Large Woody Debris (Instream), Coarse Woody Debris (riparian area)	Species and Habitat (Aquatic), Erosion Processes	Watershed Wide	Provide instream complexity of large wood 24-inches in diameter with a length of 1 bankfull width or greater. Determine number of pieces of wood per mile based on plant community. Conduct research in order to establish local standards for down wood. Reestablish coarse woody material consistent with characteristics of the plant series in the riparian zone.
Riparia Reserves	Culverts	Species and Habitat (Aquatic), Human Uses	Watershed Wide	Improve or remove culverts at stream crossings located on BLM land that jeopardize juvenile fish passage. Culverts on fish-bearing streams with gradients greater than 3% should have natural streambed with no pool below culvert.
Riparian Reserves	Fish Habitat	Species and Habitat (Aquatic)	Jumpoff Joe Creek Drainage	Increase number of resting pools for chinook in lower reaches of systems.
Riparian Reserves	Stream Shading	Species and Habitat (Aquatic)	Watershed Wide	Maintain 90% (or ore) of the existing canopy cover, promote growth of mature conifers (32" DBH or greater) within one site tree (without fish) or two site trees (with fish) of stream. Plant or protect native vegetation species (from local genetic stock) in riparian areas and wetlands to provide adequate stream shading.
Riparian Reserves	Stream flow	Species and Habitat (Aquatic)	Watershed Wide	Increase to minimum instream flow from April through October.

Table VI-4: Recommendations for Riparian Reserves

Land Allocation	Issue/Concern	Related Core Topic	Location	Recommendation
Riparian Reserves	Roads	Species and Habitat (Aquatic), Erosion Processes, Human Uses	Watershed Wide	On BLM land, decrease stream crossings, limit new road construction in riparian areas. Modify existing roads that disrupt species migration and dispersal. Surface roads used during the wet season and close (decommission, gate, barricade) roads not surfaced.
Riparian Reserves	Headwater Condition	Species and Habitat (Aquatic)	Watershed Wide	Evaluate headwater tributaries for sediment production, water contribution, and riparian potential.
Riparian Reserves	Bank Stability Zones	Species and Habitat (Aquatic)	Watershed Wide	Streams with defined channels and no annual scour greater than 50% side slope receive a 30-foot buffer and channels less than 50% side slope receive a 20 foot buffer. Also, include natural slope breaks, topography and other features in determination of zone widths.
Riparian Reserves	Sedimentation	Species and Habitat (Aquatic), Erosion Processes	Watershed Wide	Restore spawning or riffle substrate embeddedness to 30% or less and sand content to 15% or less so that erosion and sedimentation would be in balance with stream transport capacity resulting in pools with good depth and cover.
Riparian Reserves	Canopy Closure	Hydrology	Watershed Wide	Manage the transient snow zone for high canopy closure to minimize openings with less than 70% total canopy cover. This excludes precommercial thinning.
Riparian Reserves	Low Stream flows	Hydrology	Watershed Wide	Discourage spring development or surface/groundwater diversions on BLM-administered lands if the development or diversion would not meet the ACS Objectives.

Table VI-5: Recommendations for Riparian Reserves

Core Topic	Data Gaps
Botany	Nonvascular plants: No surveys have been conducted, need to survey for at least S&M species. Vascular plants: Only 27% of the watershed has been surveyed, need to survey the remainder. Noxious weeds: No surveys have been conducted. Wetlands/seeps: Little known about location and extent and no special status plant surveys done in this habitat.

Table VI-5: Recommendations for Riparian Reserves

Core Topic	Data Gaps
Wildlife	Presence/absence information for most of the special status species is unknown. Little information on special status species habitats and condition of these habitats. Location of unique habitats such as wallows, mineral licks, migration corridor for the most part unknown.
Fisheries	Condition of habitat on BLM largely unknown. Range of fish in most streams is limited. Temperature information on most streams unknown. Condition of macro-invertebrate community on BLM and nonfederal land unknown. Condition of habitat on private land largely unknown. Location of features contributing to increased sediment problems unknown. Condition of culverts in the watershed limited.
Human Use	*Transportation Management Objectives (TMOs):* TMOs have not been completed for this watershed. *BLM Capitalized Roads:* Road drainage, road grade, surface depth, road condition and barricade information exists in various formats. This information has not been updated as changes occur. Therefore, existing information may not be accurate. *BLM Non-Capitalized Roads and Skid Trails:* These types of roads and skid trails have not been inventoried. *Non-BLM Roads and Skid Trails*: These types of roads and skid trails have not been inventoried. *Quarries:* Quarry data gaps exist where the required information is missing on the Rock Resource Inventory data sheet. *Recreation*: There has been no inventory of the amount or type of recreational use of the area. There also has been no Recreation Opportunity Spectrum inventory of the existing opportunities that are available in the watershed. In order to manage for recreational values, these inventories need to be done, especially the ROS inventory. *Sociological:* There is a need to acquire sociological information by watershed on trends and community issues. Currently, information is based on personal knowledge of the watershed. There needs to be a study done along with the watershed analysis to be incorporated into the watershed analysis.
Hydrologic Riparian	Stream condition on BLM and nonfederal lands unknown. Functioning condition of riparian areas on all land unknown. Plant and animal species that inhabit the riparian buffers need to be surveyed.
Soils	Soil nutrient capital unknown. Soil erosion rates unknown. Soil dependant plant, animal and microbial species unknown. More information on road densities is needed about other small watersheds within Jumpoff Joe watershed. More information about compaction and disturbance in other small watersheds is needed.
Vegetation	Stand examination inventory data, including snag and down wood data, for the federal lands in the watershed is inaccurate and does not accurately represent stand conditions. Previous harvest data on BLM and nonfederal lands is not available
Fire	Identification of individuals who have special concerns with prescribed burning emissions, smoke dispersion modeling and amounts of smoke produced from understory burning largely unknown. Baseline emission data for various plant association and theoretical emission information for various plant association is absent. Historic fire and current fire information is not mapped. Fuel models - locations are not known or mapped for private lands, nor are the fuel models, profile, duff levels, and amounts of large woody debris amounts and locations known for private lands.

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Appendix B:
Mining Claim Information

A mining claimant/operator has the right to prospect and develop the mining claim as authorized through the General Mining Laws and amendments. Acceptable activities that normally occur on mining claims include the development of the mineral resources by extracting the gold bearing gravels, or ore, from the claim and manufacturing of the mineral materials utilizing a trommel and sluice box system, or a millsite of some sort. After the gold is extracted the tailings (waste material) are stockpiled to either be utilized in the reclamation of the site or removed to an appropriate location. Timber on site may be used in some situations if outlined in a mining notice or plan of operations.

The operator, or claimant, will be allowed to build structures and occupy the site where such uses are incidental to mining and approved in writing by the appropriate BLM authorized officer. The use and occupancy of a mining claim will be reviewed on a case-by-case basis to determine if such uses are incidental. A letter of concurrence will be issued only where the operator shows that the use or occupancy is incidental to mining; where substantially regular mining activity is occurring; and will be subject to the operator complying with all state, federal, and local governmental codes and regulations. This means that in addition to meeting the requirements to mine on a regular basis the claimant will need to meet the standards of the Oregon Uniform Building Codes and all state sanitation requirements.

The filing of mining claims gives the claimant the rights and ownership of the minerals beneath the surface of the lands encumbered by the mining claims. In most cases, management of the surface of the claims rests with the appropriate federal agency with jurisdiction.

The claimants/operators have the right to use that portion of the surface necessary in the development of the claim. In the cases where the surface of the claims are administered by the BLM or Forest Service the claimant/operator may, for safety or security reasons, limit the public access at the location of operations. Where there are no safety or security concerns the surface of the mining claims are open to the public.

In some instances the surface of the mining claim is managed by the claimant. These are usually claims that were filed before August 1955, and determined valid at that time. The claimants in these cases have the same rights as outlined above. However, they have the right to eliminate public access across that area where they have surface rights.

Appendix C:
Road Information

1. Definitions

BLM Capitalized Roads: The BLM analyzes Bureau-controlled roads to determine capitalized or non-capitalized classification. During this analysis, the BLM considers many elements, including the present and future access needs, type of road, total investment and the road location, to reach a conclusion of classification of the road. Each capitalized road is identified with a BLM road number and a capitalized value. BLM capitalized roads are managed and controlled by the BLM.

BLM Non-Capitalized Roads and Skid Trails: BLM non-capitalized roads and skid trails are not assigned a capitalized value. Non-capitalized roads are generally jeep roads and spur roads that exist due to intermittent public and administrative use. Skid trails are ground disturbances, created under a timber sale, that have not been restored to their natural surrounding environment.

Non-BLM Roads and Skid Trails: Non-BLM roads and skid trails are administered by private landowners and\or other government agencies. The BLM has no control over these roads.

Quarries: Quarries are areas of land suitable for use as a rock source to develop aggregate material for the surfacing of roads, riprap for slope protection, rock for stream enhancement projects and other miscellaneous uses. Examples of data elements for quarries: active quarry, depleted quarry.

Road Data Elements: Information on data elements is available through the Medford District road record files, right-of-way (R/W) agreement files, easement files, computer road inventory program, GIS maps, transportation maps, aerial photos and employee knowledge of existing road systems. When data gaps are determined to exist, field data will be gathered to eliminate the gaps and at the same time existing data element information will be verified. Some information on private roads does exist, but the majority will need to be researched by the BLM through privately-authorized field investigations and answers to BLM's request for information from private land. Examples of data elements for roads: road density, road surface, surface depth, road use, road drainage, road condition, road grade, gates, R/W agreements, easements, maintenance levels, barricades

2. Definition of Columns in Jumpoff Joe Watershed Road Information Tables

T- R - Sec -Seg: T = Township R = Range Sec = Section Seg = Road Segment

These columns describe the road number, location of the beginning point of the road, and the road segment.

Example of a road number: 35-7-24 A.

Name: Name of the road.

O&C: Length of road in miles that crosses O&C lands.

PD: Length of road in miles that crosses public domain lands.

Other: Length of road in miles that crosses other lands.

Total Miles: Total length of the road in miles.

Srf. Type: Road surface type. NAT- Natural, PRR- Pit Run, GRR- Grid Rolled, ABC- Aggregate Base Course, ASC- Aggregate Surface Course, BST- Bituminous Surface Treatment.

Sub. Wid: Subgrade width of the road in feet.

Srf. Dp: Road surfacing depth in inches.

Who Ctrls: Who controls the road: BLM = Bureau of Land Management, PVT = Private.

Cus. Mtn: BLM Custodial Maintenance Level. Level of maintenance needed during normal administrative use with no timber haul.

Opr. Mtn: BLM Operational Maintenance Level. Level of maintenance needed during active timber hauling.

BLM Maintenance Levels (Under Column for Cus. Mtn. and Opr. Mtn)

Level 1: This level is the minimal custodial care as required to protect the road investment, adjacent lands, and resource values. Normally, these roads are blocked and not open for traffic or are open only to restricted traffic. Traffic would be limited to use by high clearance vehicles. Passenger car traffic is not a consideration. Culverts, waterbars/dips and other drainage facilities are to be inspected on a three-year cycle and maintained as needed. Grading, brushing, or slide removal is not performed unless they affect roadbed drainage. Closure and traffic restrictive devices are maintained.

Level 2: This level is used on roads where management requires the road to be opened seasonally or for limited passage of traffic. Traffic is generally administrative with some moderate seasonal use. Typically these roads are passable by high clearance vehicles. Passenger cars are not recommended as user comfort and convenience and are not considered priorities. Culverts, waterbars/dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted as necessary only to correct drainage problems. Brushing is conducted as needed (generally on a three-year cycle) only to facilitate passage of maintenance equipment. Slides may be left in place provided that they do not affect drainage and there is at least 10 feet of usable roadway.

Level 3: This level is used on intermediate or constant service roads where traffic volume is significantly heavier approaching an average daily traffic of 15 vehicles. Typically, these roads are native or aggregate surfaced, but may include low use bituminous surfaced road. This level would be the typical level for log hauling. Passenger cars are capable of using most of these roads by traveling slow and avoiding obstacles that have fallen within the travelway. Culverts, waterbars/dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted annually to provide a reasonable level of riding comfort. Brushing is conducted annually or as needed to provide concern for driver safety. Slides affecting drainage would receive high priority for removal, otherwise they will be removed on a scheduled basis.

Level 4: This level is used on roads where management requires the road to be opened all year and have a moderate concern for driver safety and convenience. Traffic volume is approximately an average daily traffic of 15 vehicles and will accommodate passenger vehicles at moderate travel speeds. Typically, these roads are single lane bituminous surface, but may also include heavily-used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis, although a preventative maintenance program may be established. Problems are repaired as soon as discovered.

Level 5: This level is used on roads where management requires the road to be opened all year and have a high concern for driver safety and convenience. Traffic volume exceeds an average daily traffic of 15. Typically, these roads are double or single lane bituminous, but may also include heavily used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis and a preventative maintenance program is also established. Brushing may be conducted twice a year as necessary. Problems are repaired as soon as discovered.

Who Mtn: This column changes based on who's responsible for maintaining the road. BLM- Bureau of Land Management, PVT- Private, TSO- Timber Sale Operator, or Other.

Comments: Comments pertaining to each road.

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
34 S	04 W	08.00	D	Dutch Creek Summit	0	0	.90	0.90	NAT	14		BLM	2	3	BLM	
34 S	05 W	02.00		Daisy Cutoff (Aka Sec. 1)	0	0	1.20	1.20	PRR	14	6	BLM	3	3	BLM	Portion of original road
34 S	05 W	12.00		Sec. 11 Ridge	.88	0	.12	1.00	NAT	14		BLM	2	2	BLM	
34 S	05 W	14.00		Brass Nail	1.14	.60	0	1.74	NAT	14		BLM	3	3	BLM	
34 S	05 W	14.01		Daisy Mine Sp	.11	.46	0	.57	NAT	18		BLM	2	3	BLM	
34 S	05 W	14.02	A	Jacques Creek	.67	.47	0	1.14	GRR	14	8	BLM	3	3	BLM	
34 S	05 W	14.02	B	Jacques Creek	.78	0	0	.78	NAT	14		BLM	1	1	BLM	
34 S	05 W	15.03		Jacques Sp	.52	0	0	.52	NAT	14		BLM	1	1	BLM	
34 S	05 W	20.00	A	Daisy Mine	0	.07	.5	.57	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	20.00	B	Daisy Mine	.08	0	0	.08	GRR	14	8	BLM	3	3	BLM	
34 S	05 W	20.00	C1	Daisy Mine	1.25	0	0	1.25	GRR	14	8	BLM	3	3	BLM	
34 S	05 W	20.00	C2	Daisy Mine	.45	0	0	.45	NAT	17		BLM	2	2	BLM	
34 S	05 W	20.00	D	Daisy Mine	0	0	.46	.46	NAT	16		PVT	1	1	Other	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
34 S	05 W	20.00	E	Daisy Mine	1.20	0	0	1.20	NAT	16		BLM	2	2	BLM	
34 S	05 W	20.00	F	Daisy Mine	0	0	.33	.33	GRR	14	8	BLM	3	3	BLM	
34 S	05 W	20.00	G	Daisy Mine	0	.27	0	.27	NAT	14		BLM	3	3	BLM	
34 S	05 W	20.00	H	Daisy Mine	0	.40	0	.40	NAT	14		BLM	2	2	BLM	
34 S	05 W	20.00	I	Daisy Mine	0	0	.54	.54	NAT	14		PVT	1	1	Other	
34 S	05 W	20.00	J	Daisy Mine	.13	0	0	.13	NAT	14		BLM	2	2	BLM	
34 S	05 W	20.00	K	Daisy Mine	0	0	.63	.63	NAT	14		PVT	2	2	BLM	
34 S	05 W	20.01		Shanks Creek	.17	1.27	.02	1.46	NAT	17		BLM	2	2	BLM	
34 S	05 W	21.01		Daisy Mine Sp	.33	0	0	.33	NAT	17		BLM	1	1	BLM	
34 S	05 W	21.02		Daisy Mine Sp	.21	0	0	.21	NAT	17		BLM	1	1	BLM	
34 S	05 W	21.03		Daisy Mine Sp	.33	0	0	.33	NAT	17		BLM	1	1	BLM	
34 S	05 W	22.01		W. Fork Jack Creek	.57	0	1.82	2.39	NAT	16		BLM	3	3	BLM	
34 S	05 W	23.00		Sunset Sp	.53	0	0	.53	NAT	14		BLM	2	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
34 S	05 W	27.00	A	Roberts Mtn Sp #1	.31	.07	0	.38	GRR	14	6	BLM	2	3	BLM	
34 S	05 W	27.00	B	Roberts Mtn Sp #1	0	.51	0	.51	ABC	14	4	BLM	3	3	BLM	
34 S	05 W	27.00	C	Roberts Mtn Sp #1	0	.30	0	.30	NAT	17		BLM	3	3	BLM	
34 S	05 W	27.01	A	Roberts Mtn S Sp	.34	0	0	.34	GRR	14	6	BLM	3	3	BLM	
34 S	05 W	27.01	B	Roberts Mtn S Sp	.40	0	0	.40	GRR	17	6	BLM	3	3	BLM	
34 S	05 W	27.01	C	Roberts Mtn S Sp	.43	0	.15	.58	NAT	16		BLM	1	1	BLM	
34 S	05 W	27.02		Roberts Knob	.50	0	0	.50	GRR	14	6	BLM	3	3	BLM	
34 S	05 W	27.04		Roberts Mtn Ridge	.14	0	0	.14	NAT	14		BLM	2	2	BLM	
34 S	05 W	27.05		Roberts Mtn Ridge	.27	0	0	.27	GRR	14	6	BLM	3	3	BLM	
34 S	05 W	27.06		Roberts Mtn Sp	.07	0	0	.07	GRR	14	6	BLM	3	3	BLM	
34 S	05 W	27.07		Roberts Mtn TS	.35	0	0	.35	NAT	14		BLM	2	3	BLM	
34 S	05 W	27.08		Roberts Mtn TS	.33	0	0	.33	NAT	15		BLM	2	3	BLM	
34 S	05 W	28.00		Winona P	1.04	1.28	0	2.32	ABC	14	4	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
34 S	05 W	28.01	A	Winona A Sp	0	.37	0	.37	ABC	14	4	BLM	3	3	BLM	
34 S	05 W	28.01	B	Winona A Sp	.05	.49	0	.54	NAT	14		BLM	2	2	BLM	
34 S	05 W	28.02		Winona B Sp	.42	.31	0	.73	NAT	14		BLM	2	2	BLM	
34 S	05 W	28.03		Winona D Sp	.04	.20	0	.24	NAT	17		BLM	2	2	BLM	
34 S	05 W	28.04		Winona E Sp	0	.09	0	.09	NAT	17		BLM	2	2	BLM	
34 S	05 W	28.05		Jack Sp	0	.20	0	.20	NAT	14		BLM	1	2	BLM	
34 S	05 W	29.00	A	Horse Creek (aka Daisy)	0	0	.24	.24	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	29.00	B	Horse Creek (aka Daisy)	.93	0	0	.93	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	29.00	C	Horse Creek (aka Daisy)	.16	0	.38	.54	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	32.00	A	Jack Creek	0	0	.64	.64	ASC	20	6	BLM	3	3	BLM	
34 S	05 W	32.00	B	Jack Creek	0	0	.48	.48	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	32.00	C	Jack Creek	.26	1.03	.5	1.79	ASC	14	6	BLM	3	3	BLM	
34 S	05 W	32.00	D	Jack Creek	.48	0	.2	.68	ASC	14	6	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
34 S	05 W	32.00	E	Jack Creek	1.22	0	.4	1.62	NAT	14		BLM	3	3	BLM	
34 S	05 W	33.00		Winona C Sp	1.03	0	0	1.03	NAT	17		BLM	3	3	BLM	
34 S	05 W	33.01		Winona Sp	.20	0	0	.20	NAT	17		BLM	1	1	BLM	
35 S	04 W	8.00	D1	Queens Creek	.30	0	0	.30	ASC	14	6	BLM	3	3	BLM	
35 S	04 W	8.00	D2	Queens Creek	2.06	0	0	2.06	ASC	14	6	BLM	3	3	BLM	
35 S	04 W	8.00	E	Queens Creek	0	0	.06	.06	ASC	14	6	BLM	3	3	BLM	
35 S	04 W	8.00	F	Queens Creek	1.59	0	0	1.59	PRR	14	6	BLM	3	3	BLM	
35 S	04 W	8.00	G1	Queens Creek	.78	0	0	.78	GRR	14	8	BLM	3	3	BLM	
35 S	04 W	8.00	G2	Queens Creek	.55	0	0	.55	GRR	14	8	BLM	2	3	BLM	
35 S	05 W	01.02		Queens Creek Sp	.77	0	0	.77	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	03.00	A	Jumpoff Joe	.30	0	0	.30	NAT	14		BLM	3	2	BLM	
35 S	05 W	03.00	B	Jumpoff Joe	0	0	1	1.00	NAT	14		BLM	3	1	Other	
35 S	05 W	03.00	C	Jumpoff Joe	.10	0	0	.10	NAT	14		BLM	3	1	Other	
35 S	05 W	03.00	D	Jumpoff Joe	0	0	1.18	1.18	NAT	14		PVT	1	1	Other	
35 S	05 W	03.00	E	Jumpoff Joe	0	0	.44	.44	NAT	14		PVT	1	3	Other	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	03.00	F	Jumpoff Joe	0	.85	0	.85	NAT	14		BLM	3	1	Other	
35 S	05 W	03.01		Jumpoff Joe Sp	1.17	0	.42	1.59	NAT	14		Other	2	2	PVT	
35 S	05 W	03.02		Orofino Gulch	1.43	.43	.18	2.04	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	03.03		Orofino Gulch Sp	.37	0	.16	.53	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	04.00	A	Orofino	0	0	.32	.32	NAT	14		PVT	1	1	Other	
35 S	05 W	04.00	B	Orofino	0	.17	0	.17	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	04.00	C	Orofino	0	0	.12	.12	ABC	14	6	PVT	3	3	Other	
35 S	05 W	04.00	D	Orofino	0	0	.27	.27	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	04.00	E	Orofino	0	0	.48	.48	ABC	14	6	PVT	3	3	Other	
35 S	05 W	04.00	F	Orofino	1.79	.28	.81	2.88	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	04.01		Orofino Gulch Sp	.22	.05	0	.27	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	04.02		Orofino Sp	1.01	0	.04	1.05	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	07.00	A	Walker Mtn Sp	.52	0	.28	.80	NAT	17		BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	08.00		Walker Mtn Sp	.14	0	.43	.57	NAT	14		BLM	2	2	BLM	
35 S	05 W	09.00	A	Walker Mtn	.31	.37	1.02	1.70	NAT	16		BLM	3	3	BLM	
35 S	05 W	09.00	B	Walker Mtn	0	0	.3	.30	NAT	16		BLM	3	3	BLM	
35 S	05 W	09.00	C	Walker Mtn	.40	0	0	.40	NAT	16		BLM	3	3	BLM	
35 S	05 W	09.00	D	Walker Mtn	1.37	0	0	1.37	NAT	16		BLM	2	2	BLM	
35 S	05 W	09.01		Orofino Gulch	0	.57	.04	.61	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	09.02	A	Cove Creek	.47	0	0	.47	NAT	17		BLM	2	3	BLM	
35 S	05 W	09.02	B	Cove Creek	.23	0	0	.23	NAT	17		BLM	2	3	BLM	
35 S	05 W	09.04		Cove Creek P	.50	0	0	.50	NAT	17		BLM	2	2	BLM	
35 S	05 W	11.00	A	Elk Mtn Joe Creek	.37	0	0	.37	ASC	14	6	BLM	3	3	BLM	
35 S	05 W	11.00	B	Elk Mtn Joe Creek	1.05	0	0	1.05	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	11.01	A	Elk Mtn Sec 11	1.05	0	0	1.05	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	11.01	B	Elk Mtn Sec 11	.11	0	0	.11	GRR	14	8	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	11.02		Elk Mtn Sp	.67	0	0	.67	NAT	14		BLM	1	1	BLM	
35 S	05 W	11.03		Elk Mtn Sp	.38	0	0	.38	GRR	14	8	BLM	3	3	BLM	
35 S	05 W	11.04		Queens Creek Sp	.29	0	0	.29	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	11.05		Queens Creek Sp	.11	0	0	.11	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	15.00		Morris Creek Sp 1	.68	0	0	.68	GRR	17	6	BLM	3	3	BLM	
35 S	05 W	15.01		Queen Louse	.39	0	0	.39	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	15.02		Upper Louse Creek Sp	.27	0	0	.27	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	15.03		Morris Creek E	.24	0	0	.24	NAT	17		BLM	2	2	BLM	
35 S	05 W	20.00	A	Phantom Walker	0	.51	0	.51	NAT	14		BLM	2	2	BLM	
35 S	05 W	20.00	B	Phantom Walker	0	.50	0	.50	NAT	14		BLM	2	2	BLM	
35 S	05 W	20.00	C	Phantom Walker	0	.50	0	.50	NAT	14		BLM	2	2	BLM	
35 S	05 W	20.01		Phantom Walker Sp	1.55	.01	0	1.56	NAT	17		BLM	2	2	BLM	
35 S	05 W	20.02	A	Fire Walker	0	.10	0	.10	NAT	14		PVT	2	2	PVT	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	20.02	B	Fire Walker	0	0	.19	.19	NAT	14		PVT	2	2	PVT	
35 S	05 W	20.02	C	Fire Walker	0	0	.4	.40	NAT	14		PVT	2	2	PVT	
35 S	05 W	20.02	D	Fire Walker	.49	0	0	.49	NAT	14		Other	2	2	PVT	
35 S	05 W	20.02	E	Fire Walker	0	0	.27	.27	NAT	14		PVT	2	2	PVT	
35 S	05 W	20.02	F	Fire Walker	0	0	.1	.10	NAT	14		Other	2	2	PVT	
35 S	05 W	20.02	G	Fire Walker	0	0	.38	.38	NAT	14		Other	2	2	PVT	
35 S	05 W	20.02	H	Fire Walker	0	0	.87	.87	NAT	14		Other	2	2	PVT	
35 S	05 W	21.00	A	Granite Hill	.32	0	1.35	1.67	BST	16	8	BLM	4	4	BLM	
35 S	05 W	21.00	B	Granite Hill	0	.65	.61	1.26	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	21.01	A	Morris Creek	.64	.46	0	1.10	PRR	14	2	BLM	3	3	BLM	
35 S	05 W	21.01	B	Morris Creek	0	.56	.03	.59	PRR	14	2	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	21.01	C	Morris Creek	.71	0	0	.71	PRR	14	2	BLM	3	3	BLM	
35 S	05 W	21.01	D	Morris Creek	.78	0	0	.78	NAT	17		BLM	2	2	BLM	
35 S	05 W	21.02		Morris Creek A	.74	0	0	.74	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	22.00		Morris Creek B	.14	.54	0	.68	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	22.01		Morris Creek C	.07	.04	0	.11	NAT	17		BLM	2	2	BLM	
35 S	05 W	23.00		N Fork Louse Creek Sp	.43	0	0	.43	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	23.01	A	N Fork Louse Creek Sp	.23	0	0	.23	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	23.01	B1	N Fork Louse Creek Sp	.09	0	0	.09	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	23.01	B2	N Fork Louse Creek Sp	.13	0	0	.13	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	23.02		N Fork Louse Creek Sp	.15	0	0	.15	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	23.03		N Fork Louse Creek Sp	.30	0	0	.30	PRR	14	6	BLM	1	1	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	23.04	A	N Fork Louse Creek Sp	.32	0	0	.32	ABC	14	4	BLM	3	3	BLM	
35 S	05 W	23.04	B	N Fork Louse Creek Sp	.27	0	0	.27	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	23.05		Granite Hill Sp	.69	0	0	.69	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	23.06		N Fork Louse Creek Tie	.24	0	0	.24	ABC	14	6	BLM	3	3	BLM	
35 S	05 W	25.00		N Fork Louse Creek Sp	1.24	0	0	1.24	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	25.01		N Fork Louse Creek A	.69	0	0	.69	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	25.02		N Fork Louse Creek Sp	.42	0	0	.42	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	25.04		Old Baldy Road Sp	.18	0	0	.18	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	25.05		Old Baldy Road Sp	.38	0	0	.38	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	25.06		Old Baldy Road Sp	.35	0	0	.35	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	25.07		Old Baldy Sp	.14	0	0	.14	NAT	14		BLM	2	2	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	26.00	A	Louse Mtn	.64	0	.45	1.09	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	26.00	B	Louse Mtn	3.20	0	0	3.20	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	26.01	A	N Fork Louse Creek	1.04	.08	.58	1.70	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	26.01	B	N Fork Louse Creek	1.48	0	.18	1.66	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	26.02	A	Jones Creek	1.61	0	.46	2.07	ABC	14	4	BLM	3	3	BLM	
35 S	05 W	26.02	B	Jones Creek	2.79	0	.06	2.85	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	26.03		Louse Creek Mining CL 44ld	.01	0	0	.01	NAT	12		BLM	1	1	BLM	
35 S	05 W	26.04	A	Granite Hill	1.24	.60	.17	2.01	ASC	14	4	BLM	3	3	BLM	
35 S	05 W	26.04	B	Granite Hill	1.63	0	0	1.63	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	26.05		N Fork Louse Creek Sp	.66	.03	0	.69	NAT	14		BLM	2	2	BLM	
35 S	05 W	26.06		N Fork Louse Creek Sp	0	.38	0	.38	PRR	14	6	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	27.00		Louse Divide Sp	.63	0	0	.63	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	33.01		Gas Line Sp	.66	0	0	.66	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	33.02		Jones Sp	.28	0	0	.28	NAT	14		BLM	1	1	BLM	
35 S	05 W	33.03		Jewitt Mine	.13	0	.11	.24	NAT	12		JT	1	1	BLM	
35 S	05 W	35.00	A	Old Baldy	.08	0	0	.08	ASC	16	4	BLM	3	3	BLM	
35 S	05 W	35.00	B	Old Baldy	1.52	.58	0	2.10	ASC	16	4	BLM	3	3	BLM	
35 S	05 W	35.00	C	Old Baldy	.27	0	0	.27	PRR	14	6	BLM	3	3	BLM	
35 S	05 W	35.01		Old Baldy Sp	.02	.13	0	.15	NAT	14		BLM	2	2	BLM	
35 S	05 W	35.02		Louse Mtn Sp	.09	0	0	.09	NAT	14		BLM	2	2	Other	
35 S	05 W	35.03		Louse Mtn	1.46	0	0	1.46	GRR	17	6	BLM	3	3	BLM	
35 S	05 W	35.04		Louse Mtn Sp	.47	0	0	.47	GRR	17	8	BLM	3	3	BLM	

Table C-1: Joe Louse Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid. (Ft)	Srf. Dp. (In)	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
35 S	05 W	35.05		Louse Mtn Sp	.25	0	0	.25	GRR	17	8	BLM	3	3	BLM	
35 S	05 W	35.06		County Sp	.11	0	0	.11	NAT	14		BLM	1	1	BLM	
35 S	05 W	35.07	A	Pettit Sp	.10	0	0	.10	PRR	14	4	BLM	1	1	BLM	

Appendix D:
Stream Survey Information from 1970's

Table D-1: Bummer Creek from Mouth (6/73)

Mile	LWD (pcs./ Miles/l)	Shade (h/m/l)	Dominant Substrate	Flow Nil/ Inter. (h/m/l)	Dom. Riparian. Veg. (con/hd/shrub)	No. Rearing Pools (h/m/l)	Embed (poss./ yes/ no)	Comments
0-1.0	L-M LWD	H	Gravel H	L	HD	L	N	
1.0-2.0	L-M LWD	Farmland L	Gravel H	L	Con, HD	L	Y	
2.0-3.0	Same	Farm L	Gravel H	L	Con, HD	L	Y	
3.0-4.0	Same	H	Gravel H	L	Con, HD	L	N	
4.0-5.0	Same	H	Gravel H	L	Con, HD	L	N	Mi. 4.17- Concrete/ Wood weir
5.0-6.0	Same	H	Gravel H	L	Con, HD	L	N	
6.0-7.5	Same	H	Gravel H	L	Con, HD	L	N	

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-2: Ewe Creek from Mouth (6/73)

Mile	Fish (spp)	Temp (F)	Grad (%)	LWD pcs/ miles/l	Shade h/m/l	Dominant Substrate	Flow nil/ inter. h/m/l	Dom. Rip./ Veg. con/ hd/ shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comm
0-1.0	CO,Rss ST,CT	62	<3	LWD Good	H	Cobble Bed	Low	Con HD	L	------	2' Concr. Weir at mi. .44
1.0-2.0	CO,Rss ST,CT	60	3	LWD Good		Cobble Bed	Low		L	------	

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth

4 - Gradient percentage

Table D-3: Quartz Creek from Mouth (6/73)

Mile	Fish (spp)	Temp. (F)	Grad. (%)	LWD PCs./ miles/l	Shade h/m/l	Dominant Substrate	Flow nil/ inter. h/m/l	Dom. Rip./ Veg. con/ hd/ shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comment
0 - 1.0	Ct,Co St, Rss	54-66 Mouth to top		LWD H	H	Cobble, Gravel	L	HD	H		
1.0 - 2.0	Ct,Co St			Same	H	Cobble, Gravel	L	HD	H		Rock falls at mi. 1.26 St stopped
2.0 - 3.0	Ct,Co			Same	H	Cobble, Gravel	L	HD	H		
3.0 - 4.0	Ct,Co			Same	H	Cobble, Gravel	L	Con.	H		Old growth
4.0 - 4.25	Ct,Co			Same	H	Cobble, Gravel	L	Con.	H		4 irr. diversions near mouth

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-4: Louse Creek from Mouth (7/70)

Mile	Fish (spp)	Temp (F)	Grad (%)	Shade h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. Rip./ Veg. Con/ Hd/ Shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comment
0 - 0.25	St,Ct, Rss, Dace		1	L	Cobble, Bedrock	Dry	Shrub	H	2	
0.25 - 0.50	T through out		1	L	Same	Dry	Shrub	L	1.5	
0.50 - 0.75			1	L	Same	Nil	Alder willow shr	M	?	
0.75 - 1.00			1	L	Same	Nil	?	H	1	
1.00 - 1.25			1	L	Same	Nil	?	H	1	
1.25 - 1.50			1	?	Same	Nil	?	H	1	
1.50 -1.75			1	L	Same	Nil	Shrub	M	2	
1.75 - 2.00			1	L	Same	Nil	shrub	M	?	
2.00 - 2.25			1	L	Same	Nil	?	M	?	
2.25 - 2.50			1	L	Same	Nil	-------	M	1	
2.50 - 2.75			1	L	Same	Nil	Alder willow	L	?	
2.75 - 3.00			1	L	Same	Inter Nil	Alder shrub	L	1	
3.00 - 3.25			1	L	Same	Nil	Alder	L	?	
3.25 - 3.50			1	L	Same	Nil	Alder	L	1	
3.50-3.75			1	L	Same	Nil	Alder	L	1	
3.75-4.00			2	M	Same	Nil	?	M	?	
4.00-4.25			2	M	Same	Nil	Alder, shrub	L	1	
4.25-4.50			2	L	Cobble, Bedrock	Nil	Alder	H	?	

Table D-4: Louse Creek from Mouth (7/70)

Mile	Fish (spp)	Temp (F)	Grad (%)	Shade h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. Rip./ Veg. Con/ Hd/ Shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comment
4.50-4.75			2	L	Cobble, Bedrock	Low	Ash,Alder shrub	L	1.5	
4.75-5.00			2	?	Cobble	Low	Alder / Willow	L	?	
5.00-5.25			2	M	Same	Low	?	M	?	
5.25-5.50			2	M	Same	Low	Alder	M	1	
5.50-5.75			2	M	Same	Low	?	M	?	
5.75-6.00			2	?	Same	Low	?	M	?	
6.00-6.25			2	M	Same	Low	Alder	L	1	
6.25-6.50			2	M	Same	Low	Alder	M	?	
6.50-6.75			2	M	Same	Low	-------	M	2	
6.75-7.00			3+	?	Same	Low	?	H	2	
7.00-7.25			3+	M	Same	Low	-------	M	2	
7.25-7.50			3+	M	Same	Low	-------	M	2	
7.50-7.75			3+	M	All Bedrock	Low	-------	M	2	
7.75-8.00			3+	H	Cobble, Bedrock	Low	Old-Gr/Alder	L	------	
8.00-8.25			3+	H	Cobble, Bedrock	Low	Old -Gr /Alder	L	------	
8.25-8.50			3+	H	Cobble	Low	Alder / Maple	L	1.5	
8.50-8.75			3+	H	Cobble, Bedrock	Low	-------	M	2	
8.75- 9.00			3+	H	Cobble	H	Alder Maple	M	2	

Table D-4: Louse Creek from Mouth (7/70)

Mile	Fish (spp)	Temp (F)	Grad (%)	Shade h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. Rip./ Veg. Con/ Hd/ Shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comment
9.00-9.25			3-4	H	Cobble	H	-------	L	3	7' concrete dam at mile 9.57

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-5: Morris Creek from Mouth (4/74)

Mile	Fish (spp)	Temp. (F)	Grad. (%)	Shade h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	LWD PCs./ Miles/l	Dom. Rip./ Veg. Con/ Hd/ Shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comments
0 - 1.0	Co, St, Ct	50-60	-------	H	Bedrock, cobble	L	Moder.	Con	?	-------	Irrigation divers. At mile .31 takes ½ stream flow
1.0 - 1.25		50-60	-------	H	Bedrock, cobble	L	Moder.	Con	?	-------	14 ft. Falls at mile .88

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-6: Soldier Creek from Mouth (7/73)

Mile	Fish (spp)	Temp (F)	Grad. (%)	LWD pcs./ Miles/l	Shade h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. Rip./ Veg. Con/ Hd/ Shrub	No. Rearing Pools h/m/l	Res. Pool Dep. (ft.)	Comments
0-1.0		-------	-------	?	L	Cobble	Dry	Shrub	L	-------	Possible Sewage Problem at mile 0.75
1.0-1.25		-------	-------	?	L	Cobble	Dry	Shrub	L	-------	
1.25-1.50	CT Small Pop.	-------	-------	?	H	Cobble	L	Old Gr. Con	L	-------	

Footnotes: 1- Number of rearing pools
2- Dominant riparian vegetation - conifer/hardwood/shrub
3- Residual pool depth
4- Gradient percentage

Table D-7: Louse Creek from Mouth (7/70)

Mile	No. [1] Rearing Pools h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. [2] Rip./ Veg. Con/ Hd/ Shrub	Shade h/m/l	Res. [3] Pool Dep. (ft.)	Grad. [4] (%)
0- 1.0	Medium	Cobble/Bedrock	nil	Hd shrub	Low	2	1
1.0 - 2.0	High - Medium	Cobble/Bedrock	nil	Hd shrub	Low	1.5	1
2.0 - 3.0	Low - Medium	Cobble/Bedrock	Nil	Alder shrub	Low	1	1
3.0 - 4.0	Low - Medium	Cobble/Bedrock	Nil	Alder	Low	1	1
4.0 - 5.0	Low	Cobble/Bedrock	Low	Hd shrub	Low	1.5	2
5.0 - 6.0	Medium	Cobble/Bedrock	Medium	Hd shrub	Low	1	2
6.0 - 7.0	Medium	Cobble/Bedrock	Medium	Alder shrub	Medium	1.5	2
7.0 - 8.0	Medium	Cobble/Bedrock	Medium	Hd shrub	Medium	2	3
8.0-9.0	Low - Medium	Cobble/Bedrock	High	Old growth	High	1.5	3
9.0- 9.25	Low	Cobble/Bedrock	High	Alder maple	High	2	3

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-8: Jumpoff Joe Creek - Mainstem from Mouth (7/70)

Mile	No. [1] Rearing Pools h/m/l	Dominant Substrate	Flow Nil/ Inter. h/m/l	Dom. [2] Rip. Veg. Con/ Hd/ Shrub	Temp	Shade h/m/l	Res. [3] Pool Dep. (ft.)	Grad. [4] (%)	Comments
0 - 1.0	High	Cobble/ Bedrock	Nil	Hd shrub	H	Low	2	1	
1.0 - 2.0	High	Cobble/ Bedrock	Nil	Hd shrub	H	Low	1.5	1	
2.0 - 3.0	High	Cobble/Bedrock	Nil	Alder shrub	H	Low	1	1	
3.0 - 4.0	High	Cobble/Bedrock	Nil	Alder	H	Low	1	1	Ewe, Bummer Crk. Enters
4.0 - 5.0	High	Cobble/Bedrock	Low	Hd shrub	H	Low	1.5	2	

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - Residual pool depth
4 - Gradient percentage

Table D-9: Jumpoff Joe - Mainstem (From King, April 1974)

Mile	Rearing Pools [1] h/m/l	Domin. Substr.	Flow Nil/ High/ Med/ Low	Dom. Rip. Veg. Con/ Hd/ Shrub [2]	Shade h/m/l	Fish Spp.	Temp. (F)	Grad. [4] (%)	Comments
0 - 1.0	Low	Gravel	Low	Hd/ shrub	Low	Ct, St Rss	62 6/19/73	2	Stream is 60 feet wide
1.0 - 2.0	Low	Bedrock /Cobble	?	Hd/ shrub	Low	Ct, St Rss, Dace	-	2	Stream is 60 feet wide
2.0 - 3.0	Low	Bedrock	?	Hd/ shrub	Low	Ct St Rss, Dace	-	2	Stream is 60 feet wide
3.0 - 4.0	Low-Mod.	Gravel	?	Hd/ shrub	Low	Ct, St Rss	-	2	
4.0 - 5.0	Low-Mod.	Gravel	?	Hd/ shrub	Low	Ct, Co St, Rss	-	Average width is 25 feet	2

Table D-9: Jumpoff Joe - Mainstem (From King, April 1974)

Mile	Rearing Pools [1] h/m/l	Domin. Substr.	Flow Nil/ High/ Med/ Low	Dom. Rip. Veg. Con/ Hd/ Shrub [2]	Shade h/m/l	Fish Spp.	Temp. (F)	Grad. [4] (%)	Comments
5.0 - 6.0	Low-Mod.	Bedrock /Cobble	?	Hd/ shrub	Low	Ct, St Rss	-		2
6.0 - 7.0	High	Bedrock /Cobble	?	Hd/ shrub	Low	Co, Ct Rss	86 7/1973		2
7.0 - 8.0	High	Bedrock /Cobble	Nil	Hd/ shrub	Low	Co, St Rss	-		2
8.0-9.0	High	Gravel	Low	Hd	High	Co, St Rss	70 6/1973	Stream is 12' wide	2
9.0-10.0	High	Bedrock /Cobble	Low	Con./hd	Mod.	Co, St Rss	76 1973		2
10.0-11.0	Mod.	Bedrock /Cobble	Low	Con./hd	Low	Co, Ct St, Rss	-	20 foot cascades	2
11.0-12.0	Low-Mod.	Bedrock /Boulder	Low	Con./hd	Mod.	Ct	-		2
12.0-13.0	Low	Bedrock /Cobble	Low	Hd	Low	Ct	-		2
13.0-14.0	low	Bedrock /Boulder	?	Hd	Low	Ct	-		2
14.0-15.0	Low-Mod.	Bedrock /Boulder	?	Con./hd	Low	Ct	-		2
15.0-16.0	Mod.	Boulder	?	Con./hd	Mod.	Ct	-		2
16.0-17.0	High	Boulder	Med.	Hd	Mod.	Ct	-	4 ' & 10' cascades	2
17.0-18.0	High	Bedrock /Boulder	High	Hd	Mod.	Ct	-	Lower canyon begins	2-3
18.0-19.0	High	Bedrock /Boulder	High	Hd	Mod.	Ct	-	2 log jams	2-3
19.0-20.0	High	Bedrock /Boulder	High	Con./hd	High	Ct	-	Braided channel 2 log jams plateau	1

Table D-9: Jumpoff Joe - Mainstem (From King, April 1974)

Mile	Rearing Pools [1] h/m/l	Domin. Substr.	Flow Nil/ High/ Med/ Low	Dom. Rip. Veg. Con/ Hd/ Shrub [2]	Shade h/m/l	Fish Spp.	Temp. (F)	Grad. [4] (%)	Comments
20.0-21.0	High	Bedrock /Boulder	?	Con./hd	Low	Ct	-	Beaver dams 2 logs jams plateau / old sawdust pile	1
21.0-22.0	High	Bedrock/Silt	?	Hd	Low	Ct	-	Beaver dams 2 log jams plateau	1

Footnotes: 1 - Number of rearing pools
2 - Dominant riparian vegetation - conifer/hardwood/shrub
3 - ct=cutthroat trout, st=steelhead, co=coho, rss=redside shiner
4 - Gradient percentage

Table D-10: Physical/Hydrological Survey
1996 Overall Stream Characterization Joe-Louse Watershed

Stream Name	Reaches Lower/ Middle/ Upper	Dominant Substrate	Flow Nil/ Inter. h/m/l	LWD/ CWD [1]	Embed. [2] Good Fair Poor	Dom. [3] Rip. Veg. Con/ Hd/ Shrub	Shade h/m/l	Grad. [4] (%)
Cove Branch	Middle	Cobble - Gravel	Med.	Low/Low	Good	Conifer	High	6
Jumpoff Joe	Upper	Cobble - Gravel	Med.	Low/Low	Poor	Hd - alder	High	2
Jumpoff Joe	Middle	Cobble - Gravel	High	Low/Low	Good	Alder/conifer	High	6
Jack Crk	Lower	Gravel	High	Low/Low	Poor	Alder/ conifer	Low	2
Jack Crk	Upper	Gravel	Med.	Low/Low	Good	Alder	Med.	6
N. Fk. Louse Crk	Lower	Cobble	Med.	Low/Mod	Good	Alder	Med.	4
Louse Crk	Upper	Cobble	Med.	Low/Mod	Good	Hd	Low	3-4
Louse Crk	Lower	Cobble / Gravel	Med.	Low/Low	Good	Hd	Low	4

Footnotes: 1 - LWD = instream large woody debris; CWD = riparian coarse woody debris
2 - Embed. = Embeddedness; >35% = poor and <35% = good
3 - Dominant riparian vegetation - conifer/hardwood/shrub
4 - Stream gradient percentage

Table D-11: Tributary to Quartz Creek (7/73)

Mile	No. Rear Pools h/m/l	Dom. Substr.	Flow	CWD Piecs/ Miles/l	Dom. Rip. Veg. Con/hd/ shrub	Shade h/m/l	Temp.	Species

Table D-11: Tributary to Quartz Creek (7/73)								
0-1	H	Silt, cobble	L	LWD H	old Gr. Con	H	58-61	CT. Good

Table D-12: Tunnel Creek from Mouth			
Mile	**Dom. Sub.**	**LWD PCs./miles/ l**	**Comments**
0-0.5	Silt	LWD in	No salmonid potential, poor habitat

Table D-13: Tributary to Louse Creek from Mouth (7/73)					
Mile	**Dominant Spawning Substrate**	**Flow**	**Dom. Rip. Veg. Con/hd/shrub**	**Shade h/m/l**	**Comments**
0-1	Bedrock	Dry	Hd	L	Mile .38 6' Falls- No anadromous above
1-1.5	Bedrock	Dry	Hd/con	L	Enters Lose Creek at mile 5.0

Appendix E:
Wildlife Information

Table E-1: Spotted Owl Sites Located Within Watershed

Site Name	Level of Protection
Cove Creek	100 Acre core has been established
Fall Creek	100 Acre core has been established
Granite Key	100 Acre core has been established
Jack Creek	100 Acre core has been established
Lousy Ida	100 Acre core has been established
Dog Tunnel East	100 Acre core has been established
(Dog) Tunnel Middle	100 Acre core has been established

Table E-2: Spotted Owl Sites Located Outside Watershed (With Provincial Home Range Falling Within Watershed)

Site Name	Level of Protection
Fielder Creek	100 Acre core has been established
Lousy Crooked Queen	100 Acre core has been established
McCoy	100 Acre core has been established
Bear Branch (Butte Falls R a)	100 Acre core has been established

Table E-3: Spotted Owl Habitat Availability for Known Sites

Site Name	MSNO	Bureau Administered Habitat Within 0.7 Miles (Acres)	Bureau Administered Habitat Within 1.3 Miles (Acres)	Percent Suitable Within 1.3 Miles
Bear Branch	2,628	408	1,017	29%
Cove Creek	2,230	342	656	20%
Fall Creek	2,231	486	707	21%
Fielder Creek	2,658	414	896	27%
Granite Key	3,291	338	1,070	32%
Jack Creek	2,258	278	755	23%
Lousy Crooked Queen	3,289	354	660	20%
Lousy Ida	886	306	1,026	31%
McCoy	4,042	239	1,010	30%
Dog Tunnel East	912	77	422	13%
(Dog) Tunnel Middle	1,309	207	627	19%

Table E-4: Results of Nesting Surveys in the Jumpoff Joe Watershed

Site Name	85	86	87	88	89	90	91	92	93	94	95
Cove Creek	SU	SU	SU	SU	SU	P	P	S	P	P/2	S
Fall Creek	SU	SU	SU	SU	SU	P/2	P	SI	P	P	S
Granite Key	SU	SU	SU	SU	SU	SU	SU	P	P	P/2	P
Jack Creek	SU	SU	SU	SU	SU	P/2	P	P/2	P	SI	S
Lousy Ida	NS	NS	NS	P	P	P	P	X	X	S	S
Dog Tunnel East	S/SI	SI	SI	SI	SI	X	X	S	S1	SI	SI
(Dog) Tunnel Middle	SI	SI	SI	SI	SI	X	X	S	P/2	X	P

NS = NOT SURVEYED
S = SINGLE BIRD
X = NO BIRDS PRESENT
PU = PAIR NEST STATUS UNKNOWN
U = UNKNOWN
SI = SURVEY INCOMPLETE
SU = SITE UNKNOWN AT THIS TIME
P/# = PAIR/NUMBER YOUNG PRODUCED
P = PAIR DIDN'T NEST

McKelvey rating system*:* Spotted owl habitat managed by the Bureau of Land Management has been analyzed using the McKelvey rating system. The McKelvey rating system is based on a model that predicts spotted owl population based on habitat availability. Stands are examined for criteria such as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken in consideration. During the winter and spring of 1996, stands were visually inspected and rated into the six habitat categories. This rating system has some serious short comings and does not reflect the actual amount of habitat. Factors not considered are connectivity and fragmentation. For instance a single acre of optimal habitat surrounded by clearcuts is as valuable in this rating system as an acre of optimal connected to hundreds of acres. Despite the short comings this system reflects the best available data at this time.

Special Status Species

Special status species are animals that are recognized by the federal or state government as needing particular consideration in the planning process, due to low populations (natural and human caused), restricted range, threats to habitat and for a variety of other reason. This list includes species officially listed, proposed for listing. State Listed Species are those species identified as threatened, endangered, or pursuant to ORS 496.004, ORS 498.026, or ORS 546.040. Also included are Bureau-Assessment Species which are plants and animals species that are found on List 2 of the Oregon Natural Heritage Data Base and those species on the Oregon List of Sensitive Wildlife Species (ORS 635-100-040) and are identified in BLM Instruction Memo No. OR-91-57. Bureau-sensitive species are those species eligible for federal listed, state listed, or on List 1 in the Oregon Natural Heritage Data Base, or approved by the BLM state director.

Table E-5: Special Status Species Habitat Needs

Species (Common Name)	Habitat Association	Special Habitat Feature	Concern
Grey wolf	Generalists	Large blocks of unroaded habitat	Extirpated
White-footed vole	Riparian	Alder/mature riparian	Naturally rare, modification/loss of habitat from development
Red tree vole	Mature/old growth conifer	Mature douglas-fir trees	Declining habitat quality/quantity from logging
California red tree vole	Mature/old growth conifer	Mature douglas-fir trees	Declining habitat quality/quantity from logging
Fisher	Mature/old growth riparian	Down wood/snags	Declining habitat quality/quantity & fragmentation from logging
California wolverine	Generalists	Large blocks of unroaded habitat	Declining habitat quality/quantity & fragmentation from logging and road building, human disturbance
American martin	Mature/old growth	Down wood, living ground cover	Declining habitat quality/quantity & fragmentation
Ringtail	Generalists	Rocky terrain, caves, mine adits	Northern limit of range
Townsend's big-eared bat	Generalists	Mine adits, caves	Disturbance to nurseries, hibernacula & roosts, closing mine adits
Fringed myotis	Generalists	Rock crevices & snags	Disturbance to roosts and colonies
Yuma myotis	Generalists	Large live trees with crevices in the bark &	Limited mature tree recruitment

Table E-5: Special Status Species Habitat Needs			
Species (Common Name)	**Habitat Association**	**Special Habitat Feature**	**Concern**
Long-eared myotis	Generalists	Large live trees with crevices in the bark	Limited mature tree recruitment
Long-legged myotis	Generalists	Large live trees with crevices in the bark	Limited mature tree recruitment
Pacific pallid bat	Generalists	Snags, rock crevices	General rarity/disturbance/snag loss
Peregrine falcon	Generalists	Cliff faces	Low numbers, prey species contaminated with pesticides
Bald eagle	Lacustrine/rivers	Large mature trees with large limbs near water	Populations increasing
Northern spotted owl	Mature/old growth	Late-successional mature forest with structure	Declining habitat quality/quantity & fragmentation
Marbled murrelet	Mature/old growth	Large limbed trees, high canopy closure	Declining habitat quality/quantity
Northern goshawk	Mature/old growth	High canopy closure forest for nest sites	Declining habitat quality/quantity & fragmentation, human disturbance
Mountain quail	Generalists		No concern in the watershed
Pileated woodpecker	Large trees	Large diameter snags	Snag and down log removal from logging, salvage & site prep
Lewis' woodpecker	Pine/oak woodlands	Large oaks, pines & cottonwoods adjacent to openings	Declining habitat quality/quantity fire suppression, rural & agriculture development, riparian modification
White-headed woodpecker	Pine/fir mountain forests	Large pines living and dead	Limited natural populations, logging of large pines and snags
Flammulated owl	Pine/oak woodlands	Pine stands & snags	Conversion of mixed-aged forest to even-aged forests
Purple martin	Generalists	Snags in burns with excavated cavities	Salvage logging after fire and fire suppression
Great grey owl	Pine/oak/ true fir/ Mixed Conifer	Mature forest with adjoining meadows	Declining quality/quantity of nesting and roosting habitat
Western bluebird	Meadows/ Open areas	Snags in open areas	Snag loss/fire suppression competition with starlings for nest sites
Acorn woodpecker	Oak woodlands	Large oaks	Declining habitat quality/quantity
Tricolored blackbird	Riparian	Wetlands, cattail marshes	Limited & dispersed populations, habitat loss from development

Table E-5: Special Status Species Habitat Needs			
Species (Common Name)	**Habitat Association**	**Special Habitat Feature**	**Concern**
Pygmy nuthatch	Pine forests	Large dead & decaying pine	Timber harvest of mature trees, salvage logging
Black-backed woodpecker	Pine	Snags and pine	Removal of mature insect infested trees
Williamsons sapsucker	Montane conifer forest	Trees with advanced wood decay	Removal of heart rot trees, snag removal, conversion to managed stands
Northern pygmy owl	Mixed conifer/	Snags	Snag removal, depend on woodpecker species to excavate nest cavities
Grasshopper sparrow	Open savannah	Grasslands with limited shrubs	Limited habitat, fire suppression, conversion to agriculture
Bank swallow	Riparian	Sand banks near open ground or water	General rarity, declining habitat quality
Western pond turtle	Riparian/uplands	Marshes, sloughs ponds	Alteration of aquatic and terrestrial nesting habitat, exotic species introduction
Del Norte salamander	Mature/old growth	Talus	Declining habitat quality/quantity & fragmentation
Siskiyou mtn. Salamander	Closed canopy forest	Talus	Declining habitat quality/quantity & fragmentation
Foothills yellow-legged frog	Riparian	Permanent streams with gravel bottoms	Water diversions, impoundments, general declines in genus numbers
Red-legged frog	Riparian	Marshes, ponds & streams with limited flow	Exotic species introduction loss of habitat from development
Tailed frog	Riparian	Cold fast flowing streams in wooded area	Sedimentation and removal of riparian vegetation due to logging, grazing & road building
Clouded salamander	Mature	Snags & down logs	Loss of large decaying wood due to timber harvest and habitat fragmentation
Variegated salamander	Riparian	Cold, clear seeps & springs	Water diversions & sedimentation from roads & logging
Black salamander	Generalists	Down logs, talus	Limited range, lack of data
Sharptail snake	Valley bottoms low elevation	Moist rotting logs	Low elevation agricultural and development projects that remove/limit down wood
California mountain kingsnake	Habitat generalists	Habitat generalists	Edge of range, general rarity, collectors

Table E-5: Special Status Species Habitat Needs

Species (Common Name)	Habitat Association	Special Habitat Feature	Concern
Common kingsnake	Habitat generalists	Habitat generalists	Edge of range, general rarity, collectors
Northern sagebrush lizard	Open brush stands	Open forests or brush with open understory	Edge of range, fire suppression

Table E-6: Meadows Located on Federally-Managed Lands in the Joe Louse Watershed

Location	Condition/Comment	Recommendation
T34S-R5W-Sec 35 SW1/4 SE1/4	Natural wet meadows expanded by homesteaders. Being encroached with conifers.	Encroaching trees can be cut by a single person in a day. No further treatment needed.
T34S-R5W-Sec 13 SW1/4 NE1/4	Natural meadow, expanded as a logging camp around 1945.	Encroaching trees can be cut by a single person in two days.
T34S-R5W-Sec 19	Several natural meadows, oak savannahs, and brush fields. Some of the best deer winter range in the watershed.	Area is suffering from fire suppression. Many meadows are being encroached with conifers, brush is senescent, and oak savannahs are being replaced by conifers.
T34S-R5W-Sec 21 SE1/4 SE1/4	Small natural meadow located in southeast corner of section. Very shallows soils keep this area in grass.	A little encroachment of conifers on the edge of meadow. Low priority for treatment.
T34S-R5W-Sec 29	Series of meadows and oak savannahs spread throughout section. Suffering from fire suppression and off-road vehicle use.	Reintroduce fire, block off-road vehicle access where possible.
T34S-R5W-Sec 33	Series of shallow soil meadows with Oregon white oak. Suffering from tree encroachment, and fire suppression.	Low priority, area fragmented by roads.
T34S-R5W-Sec 21	A series of meadows being encroached by brush.	Reintroduce fire in the meadows located at end of road 35-5-22.1 & 35-5-22
T34S-R5W-Sec 21	Wet meadow expanded by homesteaders, suffering from serious tree encroachment. Located between road 35-5-22 & 35-5-21	Meadow needs to have encroaching trees removed. A screen of trees should be left to buffer the effects of the roads.

Table E-7: Important Matrix Stands of Late-Successional Habitat		
Location	**Acres**	**Comments**
T34S-R5W-Sec 14 OI 006	33 Acres PD	Upper Jack Creek expands on an owl core
T34S-R5W-Sec 15 OI 014	25 Acres OC	Upper Jack Creek expands on an owl core.
T34S-R5W-Sec 23 OI 002	23 Acres PD	Upper Jack Creek expands on an owl core.
T35S-R5W-Sec 1 OI 009	44 Acres OC	Refugia upper Jumpoff Joe creek.
T34S-R5W-Sec 1 OI 001	49 Acres OC	Refugia upper Jumpoff Joe creek.
T35S-R5W-Sec 10 OI 002	24 Acres PD	Refugia upper Cove creek.
T34S-R6W-Sec 23 OI 001	17 Acres OC	Refugia near Sexton Mountain summit.
T35S-R5W-Sec 15 OI 001	38 Acres OC	Refugia Morris creek drainage.
T35S-R5W-Sec 15 OI 010	95 Acres OC	Refugia Morris creek drainage.
T34S-R7W-Sec 23 OI 001	35 Acres OC	Refugia upper Quartz creek.
T35S-R5W-Sec 23 OI 004	103 Acres OC	Refugia upper Louse creek.
T35S-R5W-Sec 25 OI 001	16 Acres OC	Refugia upper Louse creek.
T35S-R5W-Sec 25 OI 005	55 Acres OC	Refugia upper Louse creek.
T35S-R6W-Sec 1 OI 001	46 Acres OC	Refugia Walker Mountain area.
T35S-R6W-Sec 1 OI 002	89 Acres OC	Refugia Walker Mountain area.
T35S-R6W-Sec 23 OI 003	82 Acres OC	Refugia upper Quartz creek.
T35S-R6W-Sec 7 OI 001	196 Acres OC	Refugia lower Louse creek
T34S-R5W-Sec 19 OI 010, 011, 113, 012	113 Acres OC	Refugia upper Horse creek
T35S-R5W-Sec 17 OI 002, 004	130 Acres OC	Refugia lower Quartz creek

Appendix F:
Other Species and Habitats

Cavity dependent species and species utilizing down logs are of special concern in the watershed. Historically snags were produced by various processes including drought, wind-throw, fires, and insects. The amount of snags fluctuated through time in response to these events. This natural process has largely been interrupted by demands for timber harvest. The potential recovery of snag dependent sensitive species such as the Pileated woodpecker will depend on the ability of the federal agencies to manage this resource. Silvicultural practices have historically focused on even-aged stands and have resulted in deficits of snags and down logs in harvested areas. Other activities that have depleted snags and down logs are site preparation for tree planting (particularly broadcast burning), fuel wood cutting, post-fire salvage, and previous entries for mortality salvage. Managed stands that currently contain 10-12 (5 MBF) overstory trees per acre or less, are also of concern from a wildlife tree/down log perspective. Stands with remaining overstory trees have the potential to provide for current and future snag/down log requirements throughout the next rotation if existing trees are removed.

Snags and down logs provide essential nesting/denning, roosting, foraging, and hiding cover for at least 100 species of wildlife in western Oregon (Brown et al. 1985). For some species, the presence or absence of suitable snags will determine the existence or localized extinction of that species. In forested stands, cavity nesting birds may account for 30-40% of the total bird population (Raphael and White 1984). The absence of suitable snags (snags decay stage, number and distribution) can be a major limiting factor for these snag-dependent species.

The hardness (decay stage) of a snag is an important factor in determining its foraging, roosting and nesting use by individual species. Woodpeckers, like the pileated woodpecker (*Dryocous pileatus*) often choose hard snags (stage 1) for nesting where as wrens and chickadees use the softer stage 2 and 3 snags. The use of snags as a foraging substrate also changes with time and the decay stage of the snag. As a snag decomposes the insect communities found within it changes. Evans and Conner (1979) identified three foraging substrates provided by snags: the external surface of the bark, the cambium layer and the heartwood of the tree.

Snags are also used as food storage sites and as roosting/resting sites for many species. A variety of mammals, birds and some owls use snags to cache prey and other food items. Vacated nesting cavities are often used by wildlife for protection from inclement weather or on hot summer days. The marten (*Martes americana*) often use snags as resting and hunting sites and a pileated woodpecker may use up to 40 different snags for roosting.

Snags continue their function as a key element of wildlife habitat when they fall to the ground as down logs. Once again, down log use by individual species is dependent on the decay stage of the log. The larger the diameter of the log and the longer its length the more functional it is for wildlife. Depending on the decay stage of the log it will be used for lookout and feeding sites, nesting and thermal cover, for food storage or for foraging. For example species like the clouded salamander (*Aneides ferreus*) require the micro-habitat provided by bark

sloughing of the log where as small mammals such as red-backed voles (*Clethrionomys occidentalis*) burrow inside the softer logs.

Past and future management BLM policy as outlined in the current RMP target at maintaining primary cavity nesting species at 40% of their naturally occurring population levels (biological potential). Maintaining biological potential at 40% is considered to be the minimal viable population level for any given species. By managing for primary cavity nesters at 40% biological potential we have also managed for many other snag and dependent species, such as flying squirrels (*Glaucomys sabrinus*), mountain bluebirds (*Sialia currucoides*) and Vaux's swift (*Chaetura vauxi*) at an unknown level. Managing for populations at 40% biological potential does not allow for species flexibility in adapting to changing environments or to major environmental events such as wildfire or long-term climatic change. In addition, managing at 40% biological potential does not meet BLM policy guidelines for those species where we are trying to restore, maintain and enhance existing populations (BLM Manual 6840).

Appendix G:
Fire Management Planning - Hazard, Risk, And Value At Risk Rating Classification Method And Assumptions

A. HAZARD

Hazard rating is based on the summation total points assigned based on six elements as follows:

1) Slope:

Percent	Points
0-19	5
20-44	10
45+	25

2) Aspect:

Degree	Points
316-360, 0-67	5
68-134, 294-315	10
135-293	15

3) Position On Slope

	Points
Upper 1/3	5
Midslope	10
Lower 1/3	25

4) Fuel Model:

Model	Points
Grass 1, 2, 3	5
Timber 8	5
Shrub 5	10
Timber 9	15
Shrub 6	20
Timber 10	20
Slash 11	25
Shrub 4	30
Slash 12, 13	30

5) Ladder Fuel Presence: Points
(Use when forest vegetation has DBH of 5" or greater (vegetation condition class 6). Exceptions are possible based on stand conditions.)

Ladder fuel absent.	0
Present on less than 1/3 percent of area; vertical continuity can be either less or greater than 50%.	5
Present on 1/3 to 2/3 percent of area; vertical continuity is less than 50%.	15
Present on 1/3 to 2/3 percent of area; vertical continuity is greater than 50%.	25
Present on greater than 2/3 percent of area; vertical continuity is less than 50%.	30
Present on greater than 2/3 percent of area; vertical continuity is greater than 50%.	40

6) SUMMARY RATING:

POINTS	HAZARD RATING
0-45	LOW
50-70	MODERATE
75-135	HIGH

B. RISK

Assigned based on human presence and use, and on lightning occurrence.

HIGH RATING: When human population areas are present on or adjacent within 1/4 mile of the area; area has good access with many roads; relatively higher incidence of lightning occurrence; area has high level of human use.

MODERATE RATING: When area has human access and experiences informal use; area is used during summer and fall seasons as main travel route or for infrequent recreational activities. Lightning occurrence is typical for the area and not notably higher.

LOW RATING: When area has limited human access and infrequent use. Baseline as standard risk, mainly from lightning occurrence with only rare risk of human fire cause.

C. VALUE AT RISK

Best assigned through interdisciplinary process. Based on human and resource values within planning area. Can be based on land allocations, special use areas, human improvements/monetary investment, residential areas, agricultural use, structures present, soils, vegetation conditions, and habitat.

Examples:

HIGH RATING: ACEC, RNA, LSR, Special status species present, critical habitats, recreation area, residential areas, farming, vegetation condition and McKelvey ratings of 81, 82, 71, 72; vegetation condition of 4 and 5. Caves, cultural, or monetary investment present. Riparian areas.

MODERATE RATING: Granitic soils, informal recreation areas and trails. Vegetation and McKelvey rating 85, 75, 65.

LOW RATING: Vegetation condition class 1, 2, 3; and vegetation 5, 6,7 with McKelvey rating 4.